

# **CHAPTER 4**

## **ENVIRONMENTAL CONSEQUENCES**

### **4.1 INTRODUCTION AND CHAPTER ORGANIZATION**

This chapter presents the direct, indirect, and cumulative impacts of the Proposed Action and its alternatives. The analyses of impacts discussed here are the basis for the comparative summary of alternatives provided in Table 2-14 in Chapter 2. These analyses, which are organized initially by the two alternatives sets, then internally within those sets by major category as presented in Chapter 3, incorporate certain assumptions.

### **4.2 IMPACT ANALYSIS ASSUMPTIONS**

The following assumptions were made in analyzing the direct and indirect environmental impacts of the alternatives considered in this EIS.

- < Direct impacts are those that are caused by the action being analyzed and occur at the same place and time as the action; indirect impacts are those that are caused by the action but are removed in distance and/or occur later in time within the reasonably foreseeable future.
- < Because federal and other agency permits are still required in order to implement mining activities on the selected lands if the land exchange is allowed, the land exchange alternative does not cause the foreseeable mining uses of the selected lands. Furthermore, because denial of a mine plan by BLM is highly unlikely (because BLM typically works with an applicant to develop an acceptable mine plan), mining could proceed on the selected lands when all necessary permits are secured whether or not the land exchange is authorized. Therefore, impacts associated with the foreseeable mining uses are not directly or indirectly caused by the land exchange.
- < Short-term or temporary impacts are those which occur during or as a result of activities within the 15-month long Project construction period or those that endure for a specific or predicted length of time but that may extend beyond the construction period. Long-term impacts are those that are expected to occur during or as a result of activities proposed for the 16-year mining operations and reclamation and beyond.
- < Mitigation measures for a direct impact may preclude other direct impacts from occurring. For example, mitigation for physical impacts to surface flows of the Gila River would result in no net impact on surface flows, thereby avoiding potential impacts to other resources associated with surface flows, e.g., listed species and Indian surface water rights. Similarly, mitigation for impacts resulting from the exchange may preclude impacts of foreseeable mining uses (e.g., archaeological sites).
- < For the land exchange alternative, the foreseeable uses of the selected lands include those actions described under the Proposed Action alternative (the Dos Pobres/San Juan Project) as well as the foreseeable uses anticipated to occur later if PDSI develops the Dos Pobres sulfide and Lone Star orebodies as described in Section 2.2.2.1.2.

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- < Implementation of the foreseeable uses of the selected lands would require PDSI to obtain all applicable federal, state, and local permits and comply with all applicable environmental laws and regulations, regardless of land ownership.
- < In the absence of site-specific design criteria, the surface disturbance impacts of the foreseeable uses of the selected lands for the possible Dos Pobres sulfide and Lone Star projects are assumed to be the maximum of the range anticipated, as defined below:
  - Production Operations and Support Use Areas: 100 percent surface disturbance
  - Transition Use Areas: 25 percent surface disturbance
  - Intermittent Use Areas: 5 percent surface disturbance
- < Impacts to the human environment of the No Land Exchange alternative are expected to be the same as those described for the Proposed Action or Partial Backfill alternatives. This assumption is based on the fact that PDSI has submitted a Mining Plan of Operations to the BLM for consideration (the Proposed Action) and that BLM authorizes any mining plan that includes adequate provisions to prevent unnecessary and undue degradation of the environment; includes measures to provide for reclamation of disturbed land; and complies with other applicable federal and state laws and regulations. The COE is also evaluating the proposed mining operations under its authority for Clean Water Act (CWA) compliance and it is reasonable to assume that either of the action alternatives in the Mine Plan Alternatives Set or some modification of these will fulfill these three requirements. Therefore, it has been assumed for the purposes of this analysis that proposed mining activities would proceed on portions of the selected land whether the land exchange is approved or not.
- < The total acreage figure in this document for the selected lands was produced by cadastral survey. Other acreages are based on title documents or on data calculated using Computer-Assisted Drafting (CAD) software and are approximate but correct in magnitude.
- < The selection of the Proposed Action alternative is not likely to cause or promote the introduction or spread of invasive species and has been addressed in the MPO and reclamation plan. Furthermore, the BLM has determined that there are no invasive, nonnative plant species known to occur on the offered lands that are not present on adjacent public lands. Offered lands would be subject to BLM policies regarding invasive, nonnative plant species if acquired under the Land Exchange alternative.

## 4.3 MINE PLAN ALTERNATIVES IMPACT ANALYSIS

### 4.3.1 Land Use

#### 4.3.1.1 Public Lands Management

**4.3.1.1.1 Proposed Action Alternative.** Under this alternative, the approximately 1,931 acres of BLM-administered lands proposed for use in the MPO would be developed by PDSI, with federal oversight by BLM under 43 CFR 3809 and 3715 and by COE under Section 404 of the CWA. BLM's short- and long-term management responsibilities for these lands would increase as part of the BLM's review and oversight of the MPO and reclamation activities on public lands. These responsibilities include ensuring compliance with federal and state laws and regulations, including those pertaining to surface occupancy of public lands under

43 CFR 3715; environmental analysis of any proposed major modifications in the MPO; securing adequate bonding; oversight of mitigation and monitoring measures other than those specifically under the jurisdiction of other agencies; and oversight of reclamation activities and post-mining land uses (PMLUs).

No special management areas, such as wildernesses, ACECs, wild and scenic rivers (including recommended segments), or NCAs, would be directly impacted by this alternative. The Gila Box RNCA is not expected to be affected by the Project because the Bonita Creek portion of the RNCA occupies a separate watershed (surface water and groundwater), and the Gila River portion of the RNCA lies upstream of project area drainage. Potential access impacts to these public recreational areas is discussed under Section 4.3.1.2.1.

Visitors' recreational use of special management areas in the Safford Field Office would likely increase by an unquantified amount as an indirect impact of the Proposed Action alternative due to the slight increase in Graham County's population as a result of additional employment from the Project; this would also indirectly increase BLM's management responsibilities for public lands within the Safford Field Office by some small, but undetermined amount.

This alternative is consistent with Graham County's Land Use and Resource Policy Plan and Implementation Plan (LURPP), which "encourages mining efforts on public and private lands" (Graham County, Comment Letter No. 74).

**4.3.1.1.2 Partial Backfill Alternative.** The mining activities proposed under this alternative would result in impacts to management of public lands, including special management areas, identical from those described for the Proposed Action alternative. BLM's increased management responsibilities for mining oversight and administrative requirements would be identical to those needed to oversee the Proposed Action alternative.

**4.3.1.1.3 No Action Alternative.** The No Action alternative would result in no changes to the existing management of public lands, including special management areas, by the BLM Safford Field Office. Although no mining activities would be permitted by either the BLM or COE, BLM, as part of its public lands management responsibilities, would continue to work with PDSI to modify the rejected MPO and develop an acceptable mine plan under 43 CFR 3809. PDSI would then have to resubmit modified Section 404 and Section 402 (AZPDES) permit applications to COE and ADEQ, respectively, for environmental review.

#### **4.3.1.2 Access and Recreation**

**4.3.1.2.1 Proposed Action Alternative.** Approval of the Dos Pobres/San Juan Project would result in the closure of public access on the upper part of San Juan Mine Road, which the public currently uses to reach recreation areas in the Gila Mountains. However, public use of the lower three to four miles of San Juan Mine Road would still be authorized, allowing the public to access public lands south of the project area. Legal public access to the Gila Box RNCA, Bonita Creek, Johnny Creek, the Safford-Morenci Trailhead, and the north side of the Gila Mountains would still be available via the Solomon Pass Road. Currently, using Solomon Pass and West Ranch Road to get to Johnny Creek and the Safford-Morenci Trailhead requires a somewhat longer travel time (about 30-40 minutes more) than using the San Juan Mine Road (S. Knox, BLM, pers. comm.). Loss of public access on upper San Juan Mine Road would affect an estimated maximum of 2,800 to 3,100 backcountry drivers who use this area each year for recreational driving; the majority of these recreationists would likely continue to access the Gila Mountains and Gila Box via the alternate route on Solomon Pass Road. Mitigation for the impact to San Juan Mine Road is described in Table 4-45 (see also Section 4.4.1.2.1).

This alternative would also remove the approximately 1,931 acres of public lands proposed for mining from public use for dispersed recreation. Since the majority of recreational use of these lands is for access to

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other public recreational areas or for hunting in AGFD Hunt Unit 28, this alternative is not expected to cause a drop in visitor use in the general area. The approximately 240 hunters per year would have to hunt in other locations in the Unit. The BLM commercial special recreation permit holders would not be able to use the selected lands if their permits are renewed (although outfitters probably only use the public lands in question for access to other public lands) (S. Knox, BLM, pers. comm.). Horseback riders and mountain bikers would also be similarly impacted by loss of public access in the project area. In particular, the annual Safford Johnny Creek Endurance Ride may have to be rerouted under this alternative because the current horseback riding event route passes through public lands in the proposed MPO area.

This alternative also creates recreational opportunities in the form of post-mining land uses involving education and tourism. Education and tourism objectives would be achieved by constructing and providing public access to a lookout point in the hills above the project area where interpretive signs would describe the mine pits and other facilities visible from that vantage point. The possibility of offering mine tours would be evaluated in the future (J. Korolsky, PDSI, pers. comm.).

**4.3.1.2.2 Partial Backfill Alternative.** This alternative would result in direct and indirect impacts to access and recreation in the project area that are identical to those described for the Proposed Action alternative.

**4.3.1.2.3 No Action Alternative.** As no mining activities would be permitted under this alternative, no changes to existing public access or recreational uses of the project area would be expected. The San Juan Mine Road and PD Mine Road would remain open to public access. Dispersed recreational use would continue to occur on the public lands in project area, including hunting in AGFD Hunt Unit 28, recreational driving, horseback riding, and mountain biking. Subject to an annual BLM special use permit and PD authorization, the Safford Johnny Creek Endurance Ride could continue to use the current route over both public and PD private lands. No post-mining tourism or educational land uses would be provided.

### 4.3.1.3 Encumbrances

**4.3.1.3.1 Proposed Action Alternative.** This alternative would directly affect the seven existing rights-of-way (ROWs) on public lands in the project area. Four of these are for electric power transmission and distribution lines; two are for telephone and telegraph lines; and one is for a radio communication site and access road; all were authorized by BLM originally to provide these services to either PDSI or the former mining operator(s). Based on the MPO, PDSI would relocate portions of the four power and two telephone lines as necessary to develop the Project and BLM would reissue the ROWs. The ROW for the radio communications site and access road would also be relocated to the south in Section 10 atop a hill on which PDSI proposes to construct a telecommunications repeater tower. PDSI would apply to the BLM for a ROW grant for that portion of the new 230 kV powerline that crosses public lands. The 230 kV line must also be approved by the Arizona Power Plant and Transmission Line Siting Committee.

**4.3.1.3.2 Partial Backfill Alternative.** This alternative would result in impacts to ROWs and easements identical to those described for the Proposed Action alternative.

**4.3.1.3.3 No Action Alternative.** There would be no change in the existing legal ROWs or easement agreements that the BLM has made for the project area.

### 4.3.1.4 Agriculture/Grazing

**4.3.1.4.1 Proposed Action Alternative.** No unique or prime farmlands are located in the project area and no direct or indirect impacts to such lands are expected.

Four grazing allotments administered by the Safford Field Office would be directly impacted by this alternative. These are the Bryce, Talley Wash, Lone Star, and Johnny Creek allotments. Portions of these allotments would be fenced off and unavailable for continued grazing (as depicted in Figure 4-1) due to safety and site security reasons. Table 4-1 summarizes the approximate acreage of public and PD-owned lands that would be removed from each allotment by the fencing and the corresponding reduction in each allotment's stocking capacity measured in Animal Unit Months (AUMs), as a result of the Proposed Action alternative. Of the 5,169 acres removed by fencing for the Project, 3,238 acres would be returned to the allotment after mine closure, and 1,931 acres would be permanently lost due to mining activity.

The Safford Field Office's annual grazing receipts would be reduced by approximately \$144 (\$1.35/AUM) as a result of the 107 AUMs removed by this alternative. Eight BLM-registered range improvements, or portions thereof, including the Bryce-Talley Wash, Stewart-Golding, and Golding-West fences, three dirt tanks, the 4612/4613 boundary fence, and the Peterson Wash pipeline, would be affected by this alternative. These improvements are located within the proposed fenced area surrounding the Project; allottees would be compensated for the loss of use or access to these facilities if this alternative is selected.

**4.3.1.4.2 Partial Backfill Alternative.** This alternative would result in impacts that are identical to those described under the Proposed Action.

**4.3.1.4.3 No Action Alternative.** The No Action alternative would not affect the current grazing use of the BLM lands in the project area. The six allotments in the project area would continue to be grazed at their current stocking rates, and allottees would continue to have access to and use of registered range improvements in their allotments. BLM would continue to receive grazing income for the current stocking capacity of the allotments.

Table 4-1. Acreage of Public and PD-Owned Lands Removed from Each Allotment as a Result of the Proposed Action Alternative, and Corresponding Reduction in the Allotment's Stocking Capacity

ALLOTMENT (Operator)	Total Allotment (acres)	Acreage Removed from Allotment Due to Project		Reduction in Stocking Capacity	
		Public Lands	PD Lands	Public Lands AUMs (%)	PD Lands AUMs (%)
Bryce Allotment (G. Bryce)	54,000	455	770	12	18
Talley Wash Allotment (Page Land & Cattle Co.)	9,703	3,766	2,310	49	30
Rest Haven Allotment (B. Smith & B. Bell)	2,317	0	0	0	0
Lone Star Allotment (Phelps Dodge Corporation)	31,829	615	179	20	6
Johnny Creek Allotment (J. Menges)	23,291	333	365	26	28
Bonita Creek Allotment (C. Amado)	25,171	0	0	0	0
<b>TOTAL</b>	<b>146,311</b>	<b>5,169</b>	<b>3,624</b>	<b>107</b>	<b>82</b>

#### 4.3.1.5 Mineral Rights

**4.3.1.5.1 Proposed Action Alternative.** No direct or indirect impacts on federal mineral rights would occur as a result of this alternative because PD owns all federal mining claims appurtenant to the public lands proposed for mining. The State of Arizona's subsurface mineral rights in Sections 16 and 32 would not be impacted by development of the Project.

**4.3.1.5.2 Partial Backfill Alternative.** Like the Proposed Action, this alternative would have no impact on PD's or other parties' federal or state mineral rights, i.e., the legal right to develop a mining claim. However, this alternative could preclude future mining of low-grade copper ore and/or result in extra costs associated with possible future extraction of such ore from the San Juan mine.

**4.3.1.5.3 No Action Alternative.** Selection of this alternative by the BLM or COE would not affect PD's or other parties' mineral rights to the project area. Development of minerals on public lands is authorized by the General Mining Law of 1872 (under which PD has filed 844 mining claims on the project area); 43 CFR 3809 regulations (under which PDSI submitted both the 1996 and the 2001 revised Dos Pobres/San Juan Plan of Operations); the Mining and Mineral Policy Act of 1970; and the National Materials and Minerals Policy, Research, and Development Act of 1980. However, such development is subject to approval of a plan of operations that meets the requirements of applicable environmental laws and regulations.

BLM must reject a mining plan that would result in unnecessary or undue degradation of the environment. According to regulations at 43 CFR 3809.5, failure to comply with applicable performance standards, terms and conditions of plan approval, and other federal and state environmental and cultural resource laws will constitute unnecessary or undue degradation. To determine whether a proposed MPO would cause such degradation, the BLM oversees an analysis of environmental impacts as required by provisions of the National Environmental Policy Act (NEPA). The BLM also relies on analyses conducted by permitting agencies—such as the COE, EPA, and ADEQ—whose permitting jurisdictions arise from federal environmental statutes such as the Clean Air Act and the CWA or state environmental laws. The implementing regulations of these statutes provide quantitative and qualitative criteria for demonstrating environmental compliance. In the case considered by this EIS, the No Action alternative would only be selected if both the Proposed Action and the Partial Backfill alternatives failed to meet the criteria stipulated for the required permit(s). If that were to happen, the COE could not issue their 404 permit; the BLM could not authorize either the Proposed Action or the Partial Backfill mining plans; and the project proponent (PDSI) could not mine under either plan. PD's ability to mine their claims under a *permissible* mine plan, however, would remain unchanged.

#### 4.3.1.6 Surface Water Rights

**4.3.1.6.1 Proposed Action Alternative.** Although ownership of surface water rights in the project area would not be impacted by the Proposed Action alternative, the proposed security/grazing fence around the mine site would physically preclude access to and use of surface water rights within the fenced boundary. Fifteen surface water rights totaling 3.9 af/yr located on BLM lands and four surface water rights totaling 75.97 af/yr located on PD lands would be directly impacted. Holders of these rights, as listed in Tables 4-2 and 4-3, respectively, would be compensated for their losses. Additionally, stormwater management facilities would reduce the watershed area contributing tributary runoff to the Gila River (see Table 4-4).

**4.3.1.6.2 Partial Backfill Alternative.** This alternative would result in impacts to surface water rights that are identical to those described for the Proposed Action alternative.

**4.3.1.6.3 No Action Alternative.** As no mining activities or surface disturbance would be authorized, this alternative would not affect existing surface water rights on the public lands in the project area.

#### 4.3.1.7 Blasting Noise and Vibrations

**4.3.1.7.1 Proposed Action Alternative.** Blasting at the Project, while scheduled to occur daily, would be of relatively low magnitude and extremely short duration. Noise and vibrations caused by blasting are not expected to adversely affect either the residents or structures in the Safford area or the telescope operations on Mt. Graham approximately 20 air miles away.

Air blasts (sound pressure, measured in decibels [dB]) and ground motion (vibrations, measured in peak particle velocity in in/sec) are common effects of pit blasting. The severity of these effects depends upon the instantaneous charge per delay, distance from the source, and a variety of other geophysical and atmospheric factors. To determine the likely nature of the air blasts and ground motions that would result from mine blasting at Dos Pobres and San Juan, a study was undertaken using standard formulas developed by Ladegaard-Pederson and Dally (1975) for estimating sound pressure and by U.S. Bureau of Mines and others for estimating ground motion (Physical Resources Engineering 1997). To conservatively estimate sound pressure of proposed blasting, 10 percent of the value for the upper limit of the curve for an unconfined blast was used, given that the design of the blast is substantially confined within the drilled rock (ibid.).

Table 4-2. Potential Impacts to Surface Water Rights on BLM Lands Under the Proposed Action and Partial Backfill Alternatives

Registry No.	Holder	Impact	Volume (af/yr)
36-0072391	Page Land & Cattle Co. (PL&C)	Under leach pad	0.20
36-0072392	PL&C	Near ore surge pile and road	0.15
36-0072393	PL&C	Under temporary laydown area	0.20
36-0072394	PL&C	Under leach pad	0.15
36-0072395	PL&C	Under aggregate borrow source area	0.10
38-0019207	BLM	Near road to SJ truck shop complex	0.10
38-0019208	BLM	Under leach pad	0.10
38-0019209	BLM	No direct impact; within fence	0.10
38-0019287	BLM	Near South diversion channel	1.30
38-0024941	P D	Under San Juan pit	0.70
38-0072385	PL&C	Near leach pad area	0.20
38-0072386	PL&C	Under soil stockpile area	0.10
38-0072387	PL&C	Near leach pad area	0.15
38-0072388	PL&C	Under temporary laydown area	0.20
38-0072389	PL&C	Near ore surge pile	0.15
<b>TOTAL</b>			<b>3.9</b>

Table 4-3. Impacts to Surface Water Rights on PD's Private Lands under the Proposed Action and Partial Backfill Alternatives

Registry No.	Holder	Impact	Volume (af/yr)
36-0060073.1	G.A. Bryce	Under West development rock stockpile area	1.61
36-0072390	Page Land & Cattle	Near Dos Pobres setback and powerline	0.30
4A-0002478	G.A. Golding	Within fenced area	1.68
4A-0001418	PL&C	Within Dos Pobres Mine setback	72.38
<b>TOTAL</b>			<b>75.97</b>

Table 4-4. Potential Change in Watershed Area Resulting from the Proposed Action

Wash	Watershed Area (ac)		Net Change (ac)
	Baseline Condition	Post-Project Condition	
Coyote/Butler	12,822	14,066	1,244
Watson	6,222	3,707	(2,515)
Talley	5,220	4,651	(569)
Cottonwood/Peterson	11,961	11,643	(318)
Wilson	4,301	4,301	0
Lone Star	6,815	6,815	0
<b>TOTAL</b>	<b>43,040</b>	<b>40,882</b>	<b>(2,158)</b>

Source: Dames &amp; Moore 1998, Table 1

Under this alternative, blasting at the mine sites is expected to occur during daylight hours, once or possibly twice a day at each pit, seven days per week. Proposed blasting techniques are described in Chapter 2. Based on the anticipated maximum charge load of 6,000 lbs, and the distances from the pit areas to the nearest residential area and the Mt. Graham observatories (approximately 7 and 20 miles, respectively), expected sound pressure and ground motion were calculated for these sites. Table 4-5 provides these data, and Figure 4-2 shows sound pressure and ground motion levels at 2-, 7-, and 10-mile radii from the mine pits.

To put these data into context, refer to Figure 4-3 and Table 4-6. Figure 4-3 shows the human and structural response to sound pressure levels and the range of sound pressure levels expected from air blasts from explosions. The expected sound pressure at Safford (96 dB) and Mt. Graham (89 dB) from blasting in the project area falls well below the "complaint" level and well within the scaled distance requirements recommended by researchers (Physical Resource Engineering 1997). For residential areas near Safford, the expected sound pressure level of the blasts would be similar to that of a riveter, but for extremely short durations. At the Mt. Graham Observatories, roughly 15 miles southwest of the project area, the expected sound pressure from blasting would be more similar to the noise generated by the pulse of a kitchen blender.



Table 4-5. Estimated Sound Pressures and Peak Particle Velocities for Safford and the Mt. Graham Observatories from Mine Blasting

Location	Distance (ft)	Sound Pressure (dB)	Peak Particle Velocity (in/sec)	
			low estimate	high estimate
Safford	36,960	96	0.0013	0.0134
Mt. Graham	104,016	89	0.0003	0.0026

Source: Physical Resources Engineering, Inc. 1997

Table 4-6 presents data comparing vibrations generated by six kinds of human activities in a test fatigue structure. Compared to these data, the estimated vibration levels from blasting at the Project that would affect structures in the Safford area (0.0013 to 0.0134 in/sec) would fall well below vibrations caused by someone walking through the structure (0.056 to 0.286 in/sec). At the Mt. Graham Observatories, vibrations would be almost imperceptible (0.0003 to 0.0026 in/sec) and of extremely short duration. It is anticipated that they would not interfere with telescope operations.

Table 4-6. Comparison of Vibrations in a Test Fatigue Structure from Six Human Activities

Location of Receptor in Test Fatigue Structure	Maximum Structure Vibrations (in/sec)					
	Jumps	Heel Drops	Entrance Door Slams	Sliding Glass Door Slams	Nail Hammering	Walking
NW corner	0.190	0.055	0.220	0.110	0.100	0.056
SE corner	0.310	0.139	0.182	0.164	0.508	0.157
S wall	1.44	0.783	1.29	0.136	0.241	0.225
W wall	1.00	0.486	1.05	0.124	0.365	0.086
Mid-floor	10.1	5.84	0.453	0.272	0.067	0.286

Source: Physical Resources Engineering, Inc. 1997, Table 5

**4.3.1.7.2 Partial Backfill Alternative.** The noise and vibrations associated with blasting would be identical as those described for the Proposed Action alternative.

**4.3.1.7.3 No Action Alternative.** This alternative would result in no mining activities, including blasting; therefore, no noise or vibrational impacts associated blasting would be expected.

#### 4.3.1.8 Visual Resources

**4.3.1.8.1 Proposed Action Alternative.** The Project would result in permanent modifications to the existing character of the landscape. Construction of the pits, leach pad, development rock and soil stockpiles, aggregate and compactible soil borrow pits and overburden stockpiles, access and haul roads, stormwater management facilities, shops, communications facilities, tanks and storage buildings, and other facilities would become a major focus of viewers' attention from viewpoints in the Safford Valley looking in the direction of the Gila Mountains. A computer-generated photographic visual simulation of the Project depicting the anticipated

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view at full build-out from a central point in Safford near Highway 70 and 20th Avenue is provided as Figure 4-4. Based on this simulation and those from two other viewpoints (Dames & Moore 1997b), BLM prepared a visual contrast rating describing and evaluating the proposed changes in the character of the existing landscape (Knox 1997). The following analysis describes the anticipated changes in the scene as depicted in Figure 4-4.

By the end of the 16-year Project, two development rock stockpiles, the leach pad, and the upper part of the back wall of the San Juan pit would be visible on the terrace above the Gila River as part of a background view from the valley (*ibid.*). At about 400- to 450-feet tall, the West Development Rock Stockpile would appear mesa-like, with the front half being visible and the remainder being hidden behind the leach pad. The East Development Rock Stockpile, while much smaller, would only partially be hidden by one of the foothills. The leach pad would also be mesa-like in appearance and fully visible. The ultimate Dos Pobres pit would not be visible from the center of Safford as the leach pad lies in front of it and only the upper back wall of the ultimate San Juan pit would be visible (*ibid.*). Together, these facilities span a distance of about four miles across the base of the Gila Mountains. None of these facilities would rise above the silhouette of the Gila Mountains.

Horizontal lines created by the tops of the mesa-like pad, development rock stockpiles, and the stormwater diversions and the diagonal lines created by the side slopes of the pad and rock stockpiles would be apparent to viewers and would contrast with the ragged horizon of the Gila Mountains (*ibid.*). To some degree, the mesa-like forms would blend with other physiographic features in the Gila Valley, such as the terraces along and parallel to the Gila River and Frye Mesa at the base of Mt. Graham.

The rock stockpiles and leach pad would probably be greyish, with a blue-to-purplish tint or brownish-reddish tint depending on the lighting, time of day, distance, etc. The visual cuts made by the stormwater diversions and the upper backwall of the San Juan pit may be slightly lighter in color than the stockpiles, but all the mining features would appear relatively smooth-textured from most in-town views.

As the project area becomes revegetated, the color and lines of the pad, rock stockpiles, pits, and roads would soften slightly, but would still be noticeable (*ibid.*). Blocky and angular human-made structures in the form of buildings, shops, and telecommunications facilities would have little-to-no contrast with the form and line of existing structures on site, and a weak to moderate contrast with the form and line of the existing landscape. The structures would be painted compatible with the surrounding landscape, creating a little-to-no contrast with the landscape. Given the distance between Safford and the project area, there would be no contrast between the texture of the proposed and existing structures and the proposed structures and the surrounding landscape.

The Project's nighttime operations would require a certain amount of lighting for safety purposes, but such lighting would be in compliance with the Graham County Lighting Ordinance, which requires shielding of outdoor lights, down-turned lights, and sodium lighting. Many of the lights used for nighttime operations at the Project would be visible from Safford and other view points within the Safford Valley, but are not expected to affect astronomical observations at Mt. Graham, Discovery Park, or Eastern Arizona College. Sources of night lighting that would be visible from locations within the valley include the truck shop, haul trucks driving to and from the pits and various stockpiles, the SX/EW plant, the ore crushing/agglomeration and conveying system, other buildings/offices, security gates, and portable light-plants placed on stockpiles during night operations involving occasional truck haulage, for safety reasons. The degree to which each of these lighted facilities would be visible varies with the viewer's location. The East development rock stockpile and leach pad (as they grow over time) and natural topography such as river terraces and foothills would likely block views of the truck shop, the ore crushing/agglomeration and conveying system, and Site No. 2 from viewpoints in the western part of the valley. For viewers on the eastern part of the valley, the leach pad (as it grows over time) would likely block views of Site No. 1. The visibility of haul truck head lights would vary much during the

course of operations, depending upon the route and the location of active dump areas on each stockpile. The planned use of conveyors for placement of agglomerated ore is expected to further reduce nighttime lighting since portable light-plants (generators with pole-mounted spot lights that are used so that haul trucks can back up safely on the stockpiles) would be unnecessary except on occasion.

The distance from viewpoints in the valley (between six to nine miles) to different parts of the project area will lessen the impact of nighttime lights to some degree. The combined effect of all lights may produce some glow on the nighttime sky, but dust abatement measures would minimize the potential for reflected glow at night.

**4.3.1.8.2 Partial Backfill Alternative.** Anticipated impacts to visual resources distinguish this alternative from the Proposed Action alternative. In general, this alternative would result in all of the same direct visual resource impacts to the form, line, texture, and color of the existing landscape as the Proposed Action, with the following exceptions. While this alternative would still be considered a major modification of the existing character of the landscape, it would slightly reduce the Project's overall visual impact by slightly reducing the height of both the West and East development rock stockpiles by about 50 feet (one lift) as compared to the Proposed Action. This height reduction is achieved by backfilling about 21 percent (80 million tons) of the total development rock (about 365 million tons) into a portion of the mined-out San Juan pit. The form of the stockpiles, however, would still be mesa-like or terrace-like to the viewer and would still be below the horizon created by the crest of the Gila Mountains. With somewhat reduced heights, the visual mass of the stockpiles would be slightly decreased compared to those of the Proposed Action alternative.

Visual quality impacts from the Project's nighttime lighting would be identical to those of the Proposed Action alternative from Years 0 through 9; in Year 10 and following, however, when backfilling starts, nighttime lighting impacts would be slightly increased by the use of light-plants needed on active dump areas for the backfill stockpile (via haul trucks, no conveyor is planned). However, as the light-plants would be located below the line of sight within the San Juan pit, this increase is expected to be minor.

**4.3.1.8.3 No Action Alternative.** Under this alternative, visual resources in the project area would remain unchanged because no mining would occur. BLM would continue to manage their lands per the applicable visual resource management objectives.

#### **4.3.1.9 Hazardous Materials**

**4.3.1.9.1 Proposed Action Alternative.** This alternative would not affect any listed federal "Superfund" or state WQARF sites, RCRA sites, ERNS sites, UST sites, LUST sites,<sup>44</sup> or open or closed landfills. One zipACIDS<sup>45</sup> site, the San Juan Mine site, lies primarily on PD's private lands and would be directly affected by the Project. Since this site lies within the proposed San Juan pit, the zipACIDS site would be eliminated as mining commences. The pit lake water that now exists at the San Juan pit would be routed into the process make-up waters for mining operations once mining commences at San Juan.

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<sup>44</sup> "Superfund" sites are on the National Priority List for remediation under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); state hazmat sites are also called Arizona Water Quality Assurance Revolving Fund (WQARF) sites; RCRA = Resource Conservation and Recovery Act; ERNS = Emergency Response Notification System; UST = Underground Storage Tanks; LUST = Leaking Underground Storage Tanks.

<sup>45</sup> ZipACIDS sites are locations in Arizona, sorted by zip code, subject to investigation under the State WQARF program and the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for possible contamination of surface water or groundwater; listing as a zipACIDS site does not mean that the location is contaminated, is causing contamination, or is in violation of state or federal statutes or regulations.

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As required by the Mine Safety and Health Administration (MSHA), PDSI must comply with all required safety measures regarding the transport, use, and storage of hazardous materials. All hazardous materials would be transported, handled, and disposed of per the requirements of the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended. To meet these requirements, PDSI has incorporated numerous safety features into the mine plan, such as double containment systems for the storage and use of sulfuric acid solutions, reagents, diluent, fuel, and other petroleum products (see Section 2.1.2.3.5 for details). The shipping company selected by PDSI to transport sulfuric acid to and from the mine would be required to comply with the applicable federal and state regulations governing the transport of cargo, including hazardous materials. The internal controls for transporting sulfuric acid used by one potential contractor are listed in Section 2.1.2.2.6. Upon closure of the mines, PDSI would be required to properly remove and dispose of hazardous materials from the mine sites per the Aquifer Protection Permit (APP) Program and reclamation requirements.

The transport, use, and storage of hazardous materials for the Project would increase the potential risk for adverse impacts associated with a spill or discharge of hazardous materials. The environmental effects of a release would depend on the substance, quantity, timing, and location of the release and could range from a minor spill of fuel on-site to a severe spill of sulfuric acid or fuel on public roads or bridges during transport to the mine site. PDSI would develop a Spill Prevention Control and Countermeasures (SPCC) Plan to address requirements for preventing accidental spills and developing procedures to be followed in the event of a spill. PDSI would also be required to meet the toxic releases inventory report requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and Section 6607 of the Pollution Prevention Act of 1990. These laws require PDSI to annually report toxic releases (including amounts) should any statutory thresholds be exceeded (T. Crawford, EPA, pers. comm.).

As described in Section 3.2.1.9, PDSI initiated and completed voluntary clean-up and stormwater management activities at the existing San Juan pit. These activities included general cleanup of debris, as well as construction of a stormwater diversion and installation of a stormwater evaporation pond. ADEQ has determined that these improvements at San Juan would be subject to the APP review process and would be treated as a new facility.

**4.3.1.9.2 Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

**4.3.1.9.3 No Action Alternative.** This alternative would not affect or result in the use of hazardous materials on public lands.

## 4.3.2 Physical Resources, Including Waters of the U.S.

### 4.3.2.1 Climate

**4.3.2.1.1 Proposed Action Alternative.** This alternative would not affect climate on a regional scale but could alter local wind patterns on the mining site. Prevailing weather patterns for the Safford Valley are governed by larger regional and global geographic factors beyond those potentially affected by the Project and would not be affected by development of the Proposed Action in any measurable way. Winds generally follow local topography and flow parallel to major valleys (Class One Technical Services 1997). On a very localized (or microclimatic) scale, wind patterns in and around the mine property would respond directly to changes in local topography caused by development of the open pit mines, stockpiles, leach pad, and other facilities. These microclimatic changes, however, are not expected to be noticeable in the natural and human environment beyond the project area.

**4.3.2.1.2 Partial Backfill Alternative.** As under the Proposed Action, winds in and around the mine property at a very localized scale would respond directly to changes in local topography that would result from development of open pit mine operations and partial backfill of the San Juan Pit. While the reduced height of the development rock stockpiles would be expected to result in different microclimatic effects, these extremely localized changes would not likely be discernible or noticeable on the human or natural environment.

**4.3.2.1.3 No Action Alternative.** This alternative would have no impact on the existing climate in the region containing the project region.

#### **4.3.2.2 Air Quality**

**4.3.2.2.1 Proposed Action Alternative.** The Project is not expected to emit air pollutants in excess of state or national standards. Arizona's State Implementation Plan (SIP) sets forth the measures to be used to attain the National Ambient Air Quality Standards (NAAQS) in designated non-attainment areas for six criteria air pollutants: particulate matter (PM<sub>10</sub>), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO), ozone (O<sub>3</sub>), and lead (Pb). Because the project area lies in an attainment area for all six pollutants, no existing non-attainment SIP requirements are applicable to the Project (J. Gibbs, ADEQ, personal communication).

Potential impacts to air quality from the Proposed Action alternative were assessed by modeling the emissions levels of the four criteria pollutants, PM<sub>10</sub>, NO<sub>x</sub><sup>46</sup>, SO<sub>2</sub>, and CO, that would reasonably be expected to emanate from the mining activity (AEC 2003b). Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) mist from the electrowinning process and speciated volatile organic compounds (VOCs) from fuel burning equipment, which appear on the Arizona Ambient Air Quality Guideline (AAAQG) list but are not criteria pollutants, were also modeled. The modeling indicated that, while this alternative would result in an increase in the ambient concentrations of criteria pollutants and the modeled AAAQG compounds, no standards would be exceeded. Modeling for air quality impacts was based on the revised MPO (PDSI 2001).

The emissions sources associated with proposed mining and mining-related activities in the project area would consist of point, area, volume, and open pit sources (AEC 2003b). Point sources include stacks and vents; area sources include wind-blown fugitives from ore piles; volume sources include vehicular traffic on roads; and open pit sources are those associated with operations in the pits, such as drilling and blasting.

Emissions are expected to be primarily fugitive emissions, those that cannot reasonably be directed through a stack, vent, or functionally equivalent opening. Such emissions include PM<sub>10</sub> (dust) from mobile equipment traffic on dirt roads, drilling, blasting, truck loading and unloading, crushing and materials handling, and wind erosion of exposed and disturbed soil. The MPO provides for dust control at the primary, secondary, and tertiary crusher plants; conveyors; coarse ore surge pile; and fine ore surge pile. Atomized water spray systems with fog nozzles and water-wetting systems would be used at these facilities to suppress dust, and pulse-type baghouse dust collection systems would be used to filter dust-laden air. Throughout construction and operations, water trucks would systematically suppress dust on haul roads and unpaved primary access roads. Commercial dust suppressants would be used in certain areas.

Sulfuric acid mist would be emitted from electrowinning operations at the SX/EW tankhouse. VOCs would originate from the generators, boiler, and other sources. Acid mist control methods being evaluated by PDSI

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<sup>46</sup> Only NO<sub>2</sub> has an NAAQS; however, predicting NO<sub>x</sub> concentration provides a very conservative method for adhering to the NAAQS because NO<sub>x</sub> emissions are primarily NO (nitrous oxide), which gradually converts to NO<sub>2</sub> over time.

include heat retention beads and balls, surfactants, water foggers, and cell wipers. Essentially, these methods either retard the release of acid mist from electrolyte within the electrowinning cell or work to contain acid mist above the cell. Emissions of VOCs during the solution extraction process would be minimized through engineering design and diluent selection for low vapor pressure. Boiler combustion gasses would be minimized through use of clean-burning fuels, such as propane and/or natural gas.

To predict concentrations of the four criteria pollutants, PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>2</sub>, and CO, Applied Environmental Consultants, Inc. (2003) used the EPA-approved Industrial Source Complex 3 (ISC3) model. Within the model, one set of receptors traced the process area boundary and a second set formed a coarse grid extending outward from the process boundary to 10 kilometers (about 6 miles) (see Figure 3-4). In addition, six special receptors at each of the following locations (downtown Safford, the Safford Municipal Airport, the nearest residence, the San Carlos Apache Reservation boundary, the Galiuro Wilderness west of the project area, and the Gila Wilderness in New Mexico) were modeled. Both wildernesses are Class I air sheds that lie within 100 kilometers (about 62 miles) of the project area. The modeling results for the process boundary and grid receptors are summarized in Table 4-7; the modeling results at the six special receptor sites are summarized in Table 4-8a. Modeling results showed that none of the assessed pollutants would exceed the applicable NAAQS at or beyond the process boundary (AEC 2003b).

Table 4-7. Maximum Ambient Impacts Due to Emissions from the Proposed Project Compared to Applicable NAAQS.

Pollutant	Averaging period	Modeled concentration (: g/m <sup>3</sup> )	Highest background concentration (: g/m <sup>3</sup> ) <sup>1</sup>	Maximum ambient concentration (: g/m <sup>3</sup> )	NAAQS (: g/m <sup>3</sup> )
PM <sub>10</sub>	24-hour	26.0 <sup>2,3</sup>	27.7	53.7	150
PM <sub>10</sub>	Annual	3.8 <sup>3</sup>	12.3	16.1	50
SO <sub>2</sub>	3-hour	219 <sup>2</sup>	94.0	313	1,300
SO <sub>2</sub>	24-hour	26.6 <sup>2</sup>	22.0	48.6	365
SO <sub>2</sub>	Annual	3.4	1.0	4.4	80
NO <sub>x</sub>	Annual	17.4	1.9	19.3	100
CO	1-hour	7,568 <sup>2</sup>	3,200	10,768	40,000
CO	8-hour	405 <sup>2</sup>	1,219	1,615	10,000

<sup>1</sup> See Section 3.2.2.2.1 for information on background concentrations.

<sup>2</sup> Highest 2<sup>nd</sup> high concentration.

<sup>3</sup> Calculated with plume depletion.

Source: AEC 2003b, Table 6.1

Concentrations of H<sub>2</sub>SO<sub>4</sub> and 12 VOCs were also modeled. The highest predicted 1-hour and 24-hour H<sub>2</sub>SO<sub>4</sub> concentrations were 16.5 : g/m<sup>3</sup> and 0.7 : g/m<sup>3</sup>, which are less than the applicable AAAQG concentrations of 22.5 : g/m<sup>3</sup> and 7.5 : g/m<sup>3</sup>, respectively. None of the predicted VOC concentrations were above the applicable AAAQGs.

Table 4-8a. Summary of Air Quality Model Results at Six Special Receptor Sites

Maximum Annual and High Second High Short-Term Concentrations (: g/m <sup>3</sup> )							
Pollutant	Averaging period*	Downtown Safford	Safford Airport	Nearest Residence	San Carlos Apache Reservation	Galiuro Wilderness	Gila Wilderness
PM <sub>10</sub>	24-hour (28, 150)	2	2	4	6	0.3	0.1
PM <sub>10</sub>	Annual (12, 50)	0.1	0.2	0.1	0.3	0.01	0.01
SO <sub>2</sub>	3-hour (94, 1,300)	9	17	9	99	9	6
SO <sub>2</sub>	24-hour (22, 365)	1	2	1	9	1	1
SO <sub>2</sub>	Annual (1, 80)	0.02	0.09	0.02	0.38	0.03	0.01
NO <sub>x</sub>	Annual (2, 100)	0.1	0.4	0.1	1.9	0.1	0.1
CO	1-hour (3,200, 40,000)	248	587	266	3,729	272	155
CO	8-hour (1,219, 10,000)	11	39	20	110	20	7

\* Values in parentheses represent the maximum background concentration and the applicable NAAQS. The background concentrations would have to be added to the above concentrations for comparison to the NAAQS.

Source: AEC 2003b, Table 6.4

As stated earlier, the Project will be classified as a minor source for all pollutants and therefore, will not be subject to PSD permitting. For the purposes of the EIS, however, emissions from the Project are assumed to consume PSD increment. Consequently, an increment analysis was performed by Applied Environmental Consultants as described below.

As defined in the EPA New Source Review Workshop Manual (Workshop Manual), the impact area for purposes of PSD increment analysis is a circular area with a radius extending from the source to: (1) the most distant point where modeling predicts a significant impact, or (2) a modeling receptor distance of 50 kilometers (about 30 miles), whichever is less. For the purposes of this analysis, the impact area was assumed to be 50 kilometers (about 30 miles). The amount of PSD increment that has been consumed (or expanded) in a PSD area for any given pollutant is determined from the emission increases and decreases that have occurred from sources in the area since the applicable minor source baseline date. The PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> minor source baseline date for the Southeast Arizona Intrastate AQCR, where the Project is located, was triggered

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on April 5, 2002 by ADEQ's completeness determination for the Bowie Power Station application. As recommended in the Workshop Manual, the increment inventory should include all increment consuming sources within the impact area and 50 kilometers (about 30 miles) beyond. A review of the ADEQ emission source data base extending 100 kilometers (about 80 miles) from the Project location identified only the proposed Bowie Power Station as a PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> increment consuming source. The Bowie Power Station will be located approximately 61 kilometers from the Dos Pobres/San Juan Project, and it is in the process of obtaining a PSD permit from ADEQ.

A further review of the impact area and 50 kilometers (about 30 miles) beyond showed that other potential locations for increment consuming sources are the rural towns of Safford (12 kilometers from Project), Bowie (59 kilometers from Project) and Wilcox (70 kilometers from Project), along with several other smaller towns. Some of these rural towns like Safford support agriculture, but none have any major industrial facilities. Moreover, there has been no new development (including new farming or new unpaved roads) or modifications to existing minor sources in these rural towns since the minor source baseline date of April 5, 2002. Thus, for purposes of this analysis, the only increment consuming sources that could potentially contribute to ambient PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> concentrations in the impact area are the Project and the Bowie Power Station.

The most conservative increment consumption analysis is one in which the maximum impacts from each source within that portion of the impact area nearest to the source being permitted are summed for comparison to the applicable increment. This approach was used for the analysis conducted for the EIS. The PM<sub>10</sub>, SO<sub>2</sub> and NO<sub>2</sub> emissions data for the proposed Bowie Power Station were modeled using the Project receptor grid. The results of the modeling are summarized in Table 4-8b. The results show that the sum of the maximum impacts from both the Project and the Bowie Power Station are below the applicable PSD increments. Therefore there is no need or requirement for offsets or mitigation measures.

Table 4-8b. Maximum Ambient Concentrations Due to Emissions from the Proposed DP/SJ Project and the Bowie Power Station Project With Comparison to Applicable PSD Increments

Pollutant	Averaging Period	Maximum Modeled Concentration From DP/SJ Project (: g/m <sup>3</sup> )	Maximum Modeled Concentration From Bowie Project (: g/m <sup>3</sup> )	Total Ambient Concentration (: g/m <sup>3</sup> )	Class II PSD Increment (: g/m <sup>3</sup> )
PM <sub>10</sub>	24-hour	26.0 <sup>a, b</sup>	0.23 <sup>a</sup>	26.23	30
	Annual	3.8 <sup>b</sup>	0.01	3.81	17
SO <sub>2</sub>	3-hour	219 <sup>a</sup>	0.59 <sup>a</sup>	219.59	512
	24-hour	26.6 <sup>a</sup>	0.08 <sup>a</sup>	26.68	91
	Annual	3.4	0.01	3.41	20
NO <sub>x</sub>	Annual	17.4	0.01	17.41	25

<sup>a</sup> Highest 2nd high concentration.



<sup>b</sup> *Calculated with plume depletion.*

Since the PSD minor source baseline date has been triggered by the proposed Bowie Power Station, future emission sources in the area may be required to analyze PSD increment consumption. The amount of increment available to accommodate future growth or future projects elsewhere increases dramatically with distance from the Project. The Project's maximum predicted increment consumption of 26.0 : g/m<sup>3</sup> is at only one location, and that location is a point at the Project's boundary. The new analysis demonstrates that the Project's predicted impacts decrease rapidly with increasing distance from the Project. This is usually the tendency with particulate matter plumes because of the dispersion of emissions and because they lose mass as the plume travels downwind. The amount of increment available for future emissions increases in Safford (12 kilometers from Project), Bowie (59 kilometers from Project), and Wilcox (70 kilometers from Project), along with several other smaller towns is thus quite large for the areas likely to be impacted by such emissions.

Any new PM<sub>10</sub> emissions in Safford and other communities also will have maximum impacts near the source that decrease outward (i.e., decrease toward the Project). Consequently, it is unlikely that the combined increment consumption of the Project and any future increment-consuming sources in Safford or other communities would exceed the available PSD increment.

The Proposed Action alternative is not expected to have a significant adverse effect on the air quality or visibility of the two Class I airsheds within 100 kilometers (about 60 miles) of the process boundary of the project area. These Class I airsheds are the Galiuro Wilderness southwest of the project area and the Gila Wilderness east of the project area in New Mexico (see Figure 3-5). To assess potential effects of emissions plumes associated with the proposed mining and mining-related activities on visibility in these wilderness areas, a visibility impact analysis was conducted using the EPA VISCREEN model (AEC 2003b). The VISCREEN model is based on anticipated emissions, which for the Project, primarily consist of fugitive dust and vehicle tailpipe emissions. Visual impacts of plumes are a function of atmospheric turbulence (wind speed and direction); local terrain; and the location, buoyancy, particle size, and frequency of emissions. The analysis is influenced and complicated by several factors, such as the influence on plume transport meteorology of intervening terrain between the Project and the area being assessed for visibility impacts.

Two levels of screening analysis were performed for each wilderness area: Level 1 screening, which is designed to provide a conservative estimate of worst-day visual impacts assuming worst-case meteorological conditions, and Level 2 screening, which must be performed if screening criteria at Level 1 are exceeded (AEC 2003b). Level 2 screening is a more complete analysis, allowing for more realistic meteorological and plume composition inputs. The Level 2 screening completed for this EIS used the 2002 revised PM<sub>10</sub> emissions inventory and more conservative modeling assumptions recommended by the U.S. Forest Service (AEC 2003b). Results of the screening indicated that visibility in the wilderness areas would not be affected by the Proposed Action.

Title III of the 1990 Clean Air Act Amendments lists 189 compounds and compound classes as hazardous air pollutants (HAPs), also referred to as "air toxics". The listed compounds include various chemicals such as benzene and toluene, minerals such as asbestos, as well as metals such as mercury and arsenic.

Air emissions from the Project will include a very small percentage of constituents classified as HAPs. Total potential emissions of HAPs from the Project are estimated to be 3.2 tons per year (tpy) (AEC 2003c). Most of this amount (approximately 2.8 tpy) is attributable to naturally occurring manganese present in the soils, ore, and development rock in the Project area. Manganese compounds, which are listed HAPs, are expected to be present in the form of manganese oxide minerals as a small percentage of total particulate emissions generated from mining, mineral handling, and truck haulage operations. Other HAPs metals, such as lead and cadmium, may also be present in particulate emissions, but in trace amounts. Trace amounts of organic chemicals listed as HAPs (e.g., benzene, formaldehyde, etc.) are also expected to be present in VOC emissions associated with the SX/EW process and fuel handling/storage, as well as in combustion gases. The methods and systems described in Section 2.1.2.3.9 for controlling air emissions will also serve to control the HAPs component of those emissions.

**4.3.2.2.2 Partial Backfill Alternative.** The primary difference between this alternative and the Proposed Action is the backfilling of 60 to 80 million tons of development rock into the San Juan pit. Permanent sources of emissions, such as conveyors and some processing facilities would be identical to the Proposed Action. Mobile emissions sources, such as haul trucks and support vehicles would follow slightly different haulage routes after Year 10 of the Project for the proposed backfilling of the San Juan pit. Truck loading and unloading associated with backfilling development rock in the San Juan pit would be a source of PM<sub>10</sub>. While the PM<sub>10</sub> and tailpipe emissions would be generated from slightly different *locations* than those of the Proposed Action, the total *quantity* of emissions (tons per year) would not be measurably different. Therefore, emissions of criteria pollutants affecting air quality are not expected to exceed standards or guidelines within any 1-hour, 8-hour, 24-hour, or annual period at or beyond the process boundary, including the City of Safford, San Carlos Apache Reservation boundary, and the Galiuro and Gila Wildernesses, based on modeling results (AEC 2003b).

For Class I airsheds within 100 kilometers of the Project, factors affecting plume visual impacts such as atmospheric turbulence (wind speed and direction); local terrain; and the location, buoyancy, particle size, and frequency of emissions are expected to be identical to the Proposed Action alternative. Therefore, the results of visibility analysis described under the Proposed Action for the Galiuro and Gila Wildernesses would be identical for this alternative.

**4.3.2.2.3 No Action Alternative.** The No Action alternative would not change existing conditions for air quality, criteria pollutants, or visibility in Class I airsheds.

### 4.3.2.3 Geology

**4.3.2.3.1 Proposed Action Alternative.** This alternative would impact some of the locatable and salable mineral resources, the geological resources of primary concern, within the 16,297 acres of public lands in the project area. As part of baseline data collection, a BLM-approved contractor evaluated locatable and salable mineral resources and found that high mineral potential for copper or related mineralization occurs on only about 265 acres, or 1.6 percent of the total, specifically on parts of parcels H, P, Q, I1, and O (see Figure 3-8). These are areas that would be impacted by development of the San Juan pit under the Proposed Action alternative (*ibid.*). The remaining public lands, approximately 16,032 acres, or 98.4 percent, have low or moderate mineral potential or high potential but at a lower level of certainty, for either open-pit or underground deposits and are not proposed for mining development. None of the lands contain 1) moderate or high mineral potential for all other metallic minerals, including placer gold; 2) known commercial quantities of non-metallic

and industrial mineral resources; 3) prospectively valuable coal, oil, gas, sodium, or potassium resources; or 4) moderate or high potential for accumulation of uranium or thorium (ibid.). Neither the known sulfide orebody underlying the Dos Pobres pit on PD's private lands, nor future access needed to develop that orebody, would be impacted by the Project because of the planned 1,300-foot setback around the pit.

For salable minerals, the Watson Wash aggregate borrow area (roughly 1/3 lies on public lands) and the existing aggregate source (entirely on public lands) located immediately downstream of the proposed leach pad would be used to provide riprap, sand, and gravels necessary for construction of stormwater channel protection, haul roads, roadbeds, and other facilities. These direct impacts to salable materials on the public lands would be long term.

**4.3.2.3.2 Partial Backfill Alternative.** The proposed backfilling of development rock in the San Juan pit would not preclude access to any currently known, economically viable reserves of metallic or non-metallic resources because such reserves would have been removed from the western portion of San Juan pit before backfilling begins in Year 10 of the Project. However, this alternative permanently removes the potential to access any ore deposits in the backfilled portion of the San Juan pit that are not currently considered economically viable but may otherwise become so due to future changes in technology or the price of copper. As under the Proposed Action, the Dos Pobres setback under this alternative has been designed to accommodate potential future development of the geological mineral resources of the Dos Pobres sulfide orebody.

**4.3.2.3.3 No Action Alternative.** This alternative would not affect existing mineral resources in the project area.

#### **4.3.2.4 Soils**

**4.3.2.4.1 Proposed Action Alternative.** Based upon SCS mapping of the project area (SCS 1981), direct impacts are expected to the soil complexes associated with the upper alluvial fan terraces, ephemeral washbeds and floodplains, and rocky upper slopes. All these soil complexes are generally characterized as poor, low-productivity soils. To the extent possible, soils would be stockpiled for reclamation along with other growth medium (PDSI 1997). Implementation of stormwater control measures and revegetation programs outlined in the MPO would limit off-site erosion potential. On-site erosion would be controlled in a manner consistent with safety and operational requirements. During construction and operations, dust suppression by watering would help control soil loss by wind erosion. Stormwater management programs, closure plans under the APP, and BLM reclamation regulations would provide protection for downstream aquatic resources in the Gila River from the effects of long-term soil erosion. Losses of soil productivity, however poor that productivity might be before project initiation, would occur in areas not subject to active reclamation programs, such as the pit sites, building pads, ponds, and support infrastructures such as roads and powerlines. These long-term losses would continue until natural successional processes resulted in the re-establishment of vegetation and productive soil profiles.

**4.3.2.4.2 Partial Backfill Alternative.** This alternative would result in direct and indirect impacts to soils that are identical to those described for the Proposed Action alternative.

**4.3.2.4.3 No Action Alternative.** As no mining or surface disturbing activities would occur under this alternative, soils or sediment yield of the project area would not be impacted by this alternative.

#### 4.3.2.5 Groundwater

##### 4.3.2.5.1 Groundwater Quantity

< **Proposed Action Alternative.** Groundwater pumping at the Dos Pobres/San Juan Project would impact groundwater elevations in the area for an extended period (over 3,000 years). The magnitude and areal extent of this impact were predicted using hydrological modeling. Development of that model and the resulting predictions are presented below.

C **Groundwater Model Development.** In conjunction with BLM hydrologists, Dames & Moore (now URS Corporation) prepared a groundwater model to evaluate the potential impact of the proposed Dos Pobres/San Juan Project on the groundwater and surface water regimes near Safford (URS 2002a). The purpose of the model was to predict what impact, if any, on regional groundwater flow might result from development of the proposed open pit mines and groundwater production wells. Of particular interest was the potential impact on surface flows in the Gila River approximately eight miles south of the proposed production well field (see Section 4.3.2.6.1, Surface Water Quantity) and the potential impact on groundwater under the San Carlos Apache Reservation, which is located within three miles of the project area at the closest point (see Section 4.3.6.1, Indian Trust Resources).

The analysis of potential mine-induced groundwater impacts was accomplished through the use of a computer simulation (model) of the regional groundwater system. In the computer model, the analyst inputs numeric information that describes the regional hydrologic characteristics within the model domain. The model then simulates regional movement and storage of groundwater. Once a model of the system has been calibrated (i.e., conforms to observation data and adequately describes known behaviors of the system), the model is then used to predict the response of the groundwater system that is likely to result from development of mine pits and groundwater pumping to support mine operations.

The model represents hydrogeologists' current understanding of the regional groundwater system and is but one of many unique solutions that may match computed and observed values with equal precision. The model integrates various elements of a complex hydrogeologic system and is the best method available to describe and predict the behavior of the system under the Proposed Action. However, since the model is not the "real world," monitoring the actual system response, comparing that response to the model's predictions, and adjusting mitigation accordingly are integral components of the 3M Program. This "model, monitor, and mitigate" (3M) approach is described in greater detail in Appendix F. The modeling effort and model predictions are described below.

The three-dimensional model was developed with a total of 226,304 calculation cells, covering approximately 500 square miles extending from north of the Gila Mountains to south of the Gila River and from about the confluence of the Gila River and Bonita Creek in the east to Eden in the west, with the project area lying approximately in the center (see Figure 4-7). A total of 17 layers simulated the vertical distance from the top of the Gila Mountains (5,248 feet) to a depth of about 3,280 feet below mean sea level. The groundwater model computer

programs MODFLOW (USGS 1983, 1996), ZONE BUDGET (Harbaugh 1990), and Visual Modflow (Waterloo Hydrologic Software 1995) were used in this analysis (see URS 2002a).

The model domain incorporates a complex hydrogeologic setting in thickly bedded sedimentary deposits in the Safford Valley and faulted and fractured andesitic and basaltic volcanic rocks at the mine property and in the Gila Mountains. Subsurface data developed by PDSI and other mining companies, and published data and interpretations from USGS reports, were used to define the hydrogeologic system. The hydrogeologic system is depicted in Figure 3-9 in Chapter 3. Both Bonita Creek and the Gila River flows were simulated in conformance with published stream flow data for the Gila River at Calva and for Bonita Creek near Morenci. Recharge to volcanic rocks and to the Lower Basin Fill was simulated as mountain-front recharge and as areal recharge over the Gila Mountains. Recharge rates and area distribution were developed in cooperation with BLM hydrologists.

Initially, the model was run in three stages: 1) a steady-state model simulating pre-mining conditions; 2) 16 consecutive transient simulations of each year of proposed mining; and 3) one 500-year transient simulation of recovery beginning at the end of Year 16. To achieve an acceptable steady-state calibration, most recharge to the model was applied as mountain-front recharge in areas adjacent to the mountains. A much smaller amount of areal recharge was also applied over the Gila Mountains. Groundwater from the San Simon basin and from the Pinaleno and Peloncillo Mountains entered the model along the model boundaries. The amounts of flow from these areas were derived from published USGS estimates and input from BLM. Irrigation pumping was simulated by an average withdrawal of water from irrigated areas of the model; pumping from individual irrigation production wells was not simulated. The rate of irrigation withdrawal was estimated as the difference between the consumptive use by crops, estimated by BLM to be 153,000 af/yr, and total diversions from the Gila River, estimated by BLM to be 100,000 af/yr (H. West, BLM, pers. comm.). Groundwater discharge from the model domain was applied at its western end near Eden to achieve an appropriate balance between inflow and outflow to the model comparable to published USGS estimates of flow through the Safford Valley near Calva (Freethey and Anderson 1986). These estimated outflows were developed in cooperation with BLM hydrologists.

The steady-state model simulated the current groundwater flow pattern throughout the model domain. It was calibrated by comparing predicted and measured well water levels, using water levels measured in wells in the model domain for which current and historical data were available. The water balance for the model is shown on Figure 4-5. A scatter plot of observed versus simulated water levels is shown on Figure 4-6. The correlation coefficient for all data is 0.98, where 1.00 is a perfect correlation (URS 2002a). A total of about 500 observations of water levels was used to calibrate the model. In addition, the model was calibrated using BLM estimates of baseflow in Bonita Creek and USGS estimates of river base flow at Calva considered to represent extreme drought conditions.<sup>47</sup> The predicted steady-state water levels are shown on Figure 4-7.

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<sup>47</sup> A low base flow value will allow for easier detection of the influence of mine pumping on the Gila River.

When the calibration statistics of the steady-state model reached acceptable limits, a transient model was developed to simulate large-scale pumping tests conducted at the project site in 1996. The model's simulated drawdown from the pumping wells and nearby monitor wells was compared to observed drawdown from the same wells. When the results were found to match within acceptable limits, as defined by BLM, the transient model was considered calibrated. The calibrated transient model was then used to simulate groundwater withdrawal from production wells in the vicinity of the proposed mine and groundwater withdrawn from open pits. Production of groundwater was simulated to increase to a maximum of 4,095 gpm, or 6,605 af/yr.

Results of the initial model run (1998 model) were reported in the Draft EIS. Since then, the model has been rerun twice to correct an over-prediction of drawdown attributable, in part, to what is called the "dry cell problem" (URS 2002a). In the 1998 model, a cell was considered "dry" and became inactive for the remainder of the simulation once the water level in that cell dropped below the bottom of the cell. As a result, the model could not accurately simulate recovery of groundwater after pumping ceased. To correct this problem and better predict realistic changes in the water table through time, the model was rerun with a "rewetting" package. The 2002 model also differed from the 1998 model in that it:

- C reduced the modeled peak pumping rate from 5,000 gpm (8,065 af/yr) to 4,095 gpm (6,605 af/yr) to reflect the reduction in predicted water demand per the revised MPO;
  - C included more realistic pit bottom areas and mine depths;
  - C contained one transient simulation stage rather than two (the 16-year mining period was combined with the post-mining period);
  - C simulated a 3,000-year period rather than a 516-year period;
  - C used time steps of shorter duration; and
  - C improved model accuracy by reducing the closure criteria for the solution of model finite-difference calculations.
- C **Model Sensitivity Analysis.** Because the 2002 ground water model is based on sparse data, except in the vicinity of the mine and south of the Gila River where data are abundant or widely distributed respectively, a sensitivity analysis was performed. Nine hydrologic parameters in the model were increased and decreased, resulting in 18 different model projections of steady-state conditions that could be compared to the 2002 model projection of steady-state (pre-mining) conditions.

The mine pumping is of primary concern because of its potential impact on the waters of the Gila River and the San Carlos Apache Reservation, and the sensitivity analysis enables a comparison of the effects of varying parameters whose true values are not known with great certainty. Appendix G lists the parameters varied, the 2002 model value for that parameter, the higher and lower values used for each parameter, and the resulting effects on the Gila

River, ground water outflow to the northwest in Safford valley, and Bonita Creek (which is a measure of impacts on the water resources of the San Carlos Apache Reservation).

The information gained by this kind of sensitivity analysis is useful in identifying model parameters which have great influence on model predictions and thus should be given priority in model refinement. Although useful in prioritizing parameter data needs, it also serves as an indication of uncertainties in the current model projections. While all the sensitivity projections showed some deviations in the predicted flows of Bonita Creek and the Gila River from the 2002 model, which is well constrained by data from the USGS stream gages on those streams, and all projections showed changes in water level elevations in various parts of the model, no other parameters were varied to bring the model projection back into calibration with observed streamflows and groundwater levels. Had such adjustments been made, the predicted impacts would have been reduced from those reported in this EIS.

The transient 2002 model was used to evaluate the sensitivity of the model projections to the storage characteristics of the volcanic aquifers underlying the San Carlos Apache Reservation north of the Butte fault. The amount of reduction of the storage parameters was related to depth, with the deeper layers having the greatest reductions. The average reduction was about one order of magnitude, and while the projection showed a negligible change in the flow of the Gila River, the predicted impact on Bonita Creek increased slightly from 0.1 acre feet per year to 0.3 acre feet per year, and the temporary drawdown in the southern corner of the Reservation in the higher parts of the Gila Mountains increased from less than a foot in the 2002 model to 1 to 3 feet, reaching a maximum northern extent at year 450. While not as exhaustive a sensitivity analysis as the one that will be performed on the final calibration of the model at the end of mining, this analysis indicates that:

- C 109 af/yr is an upper bound on predicted impacts to the flow of the Gila River;
- C 9 af/yr is an upper bound on predicted impacts to Gila River flows at the model domain's western boundary;
- C 0.3 af/yr is an upper bound on impacts to the flow of Bonita Creek.

It is noteworthy that the proposed Alternate Year Following Program exceeds by a factor of three any predicted impact to the Gila River, either directly from groundwater discharge and surface water diversion, or indirectly by contributions from Bonita Creek or augmentation by the western boundary flow between the western boundary and the San Carlos Reservoir.

- C **Groundwater Surface Elevations.** To predict the impact of the development of open pits and groundwater pumping on the groundwater surface elevation in the model domain, the drawdown cone was simulated for a period of 3,000 years. Drawdown resulting from the mining operation is predicted to expand over time away from the immediate vicinity of pumping, reaching a maximum depth around 16 years after pumping begins and a maximum extent after about 200 years (URS 2002a). This expansion is predicted to be asymmetrical, expanding first southward, then northward. The drawdown cone as defined by the one-foot contour line does not reach the Gila River, Bonita Creek, or the boundary of the San Carlos



Apache Reservation. In the model, groundwater levels recover slowly, with the depth of drawdown decreasing after Year 16, and the total extent of drawdown decreasing after Year 200. By the end of the simulated 3,000-year model period, about 80% of the 88,528 af pumped is restored and the extent of the cone of depression has greatly contracted. In a test simulation, about 97% of the pumped volume is restored after 8,000 years, so residual effects are long lasting but minor and localized. Figure 4-8 shows the maximum predicted depth of drawdown (800 feet centered at the San Juan pit at Year 16); the maximum *southern* extent of the drawdown cone as defined by the one-foot contour line (occurs at Year 100); the maximum *northern* extent of the drawdown cone (occurs at Year 800-1200); and the drawdown cone as predicted in Year 3000.

- C **San Carlos Apache Reservation.** The model estimates that about 268 af/yr of groundwater currently flows across the boundary of the San Carlos Apache Reservation to the south toward the Gila River (URS 2002a). The predicted impact of the Project would be a very slight increase in this flow, peaking at 0.2 af/yr, or about 0.07 percent of estimated current flow, in Year 50. Figure 4-9 graphically depicts the scale of this predicted impact by comparing the modeled peak impact to the modeled pre-mining flow over the 3,000-year simulation period. Decline of water table elevations beneath the San Carlos Apache Reservation are predicted to be nearly zero (URS 2002a). Potential impact in the area of the Reservation is likely to be extremely small so as to be unmeasurable because:

The Butte Fault, whose low permeability is indicated by the precipitous change in water levels that occurs across the fault, limits groundwater flow from north to south. The effect of this fault is understated in the model; therefore, the potential impacts in the area of the Reservation are likely overstated.

- C The rocks of the Gila Mountains have small hydraulic conductivity; therefore, the mountain block imposes an extensive barrier to any potential impacts north of the site.

A predicted but unmeasurable Impact on groundwater under the San Carlos Apache Reservation would not conflict with the Secretary of the Interior's fiduciary obligation to protect Indian trust assets. The effects of pumping would be monitored as part of the Mitigation and Monitoring Plan (Appendix F) submitted for this Project, and the data collected from groundwater wells located between the Project and the San Carlos Apache Reservation boundary and Bonita Creek would be analyzed to determine if the groundwater surface elevation is responding to groundwater pumping in the manner predicted by the model. No mitigation is warranted or proposed.

- C **Area Springs.** Only DP Seep would be directly impacted by proposed mining operations as it lies within the footprint of the Dos Pobres open pit on PD land. Bryce, Hackberry, Cottonwood, and Walnut Springs, all upgradient (north) of the mine pits, and separated from the pits and the area of project pumping by the Butte Fault, are not expected to be impacted by the Project's predicted drawdown of groundwater (R. Mac Nish, University of Arizona, pers. comm. 1998). Isotope sampling of springs will be done prior to project start-up to

provide further evidence as to whether the springs in the area are part of a local or regional flow system.

- C **Watson Wash Artesian Well.** The groundwater model predicts that the Watson Wash artesian well, located southwest of the project area, could be impacted by Project operations (Sinton 2002). A maximum drawdown in wellhead pressure of 0.72 foot is anticipated by Year 1200 of the model run. Potential impacts to this artesian well would be monitored at the wellhead and between the well and the Project well field. Mitigation, if predicted impacts occur, would be achieved by lowering the height of the well discharge pipe by the amount of drawdown in measured wellhead pressure. If impacts of greater magnitude were observed in the “early warning” wells located between the well field and the Watson Wash artesian well, alternative mitigation would be developed and implemented before actual impact at the well. No impacts are therefore expected to existing recreational uses or wildlife habitat at Watson Wash artesian well.
- C **Monitoring and Recalibration.** The effects predicted by the model are an estimate based upon the best available information. Calibration of the model was accomplished by trial and error adjustment of aquifer parameters within the limits of values reported in the literature for these and/or similar units. In addition, the boundary fluxes in the model were also constrained by data from USGS streamflow gages or from published estimates of subsurface flows both into and out of the model domain. While the model calibration resulted in acceptable matches of computed and observed water levels in wells, the present model is but one of many unique solutions that might match computed and observed values with equal precision. Implementation of the Model, Monitor, and Mitigate (3M) Program outlined in Appendix F will provide ongoing evaluation of the model’s predicted effects. If the changes in water levels in monitoring wells deviate in excess of established criteria from the model’s predicted changes, the model will be recalibrated to bring the projected levels and gradients within those bounds. After recalibration, the model would be rerun to determine if the revised projected river flow impacts from mining warrant changes in the acreage of land fallowed in the Alternate Year Fallowing Program.
- < **Partial Backfill Alternative.** The impacts to groundwater quantity in the region resulting from implementation of the Partial Backfill alternative are expected to be identical to those described for the Proposed Action as the water demand and supply are identical for this alternative.
- < **No Action Alternative.** This alternative would not affect existing groundwater quantity since no mining, hence no pumping, would be authorized.

#### 4.3.2.5.2 Groundwater Quality

- < **Proposed Action Alternative.** Prior to the onset of mining, water quality sampling will be undertaken to better characterize water quality in the vicinity of the mine and to improve the understanding of the flow system; this sampling will be done in addition to sampling that will be required by PD’s APP permit. Because of groundwater protection measures designed to Best Available Demonstrated Control Technology (BADCT) standards—such as the liner systems for the leach pad, PLS excess process solution pond, and stormwater impoundment—the Proposed Action

alternative is not expected to result in exceedances of numeric aquifer water quality standards at or beyond the proposed points of compliance identified in PDSI's APP application. APP closure requirements include permanent strategies to control run-on, runoff, and infiltration; therefore, post-Project groundwater quality is expected to continue to meet state aquifer water quality standards.

Under Arizona's Environmental Quality Act of 1986, PDSI must obtain an APP to implement mining activities. PDSI submitted an application for the APP to the ADEQ in October 1998. The APP would cover all potentially discharging facilities, such as the leach pad, stormwater impoundment, PLS excess process solution pond, and the existing evaporation pond at San Juan. The APP process provides opportunities for public review and requires PDSI to demonstrate compliance with BADCT design standards for potentially discharging facilities. Arizona's APP requirements stipulate that at applicable points of compliance, groundwater quality must meet state numeric aquifer water quality standards, which are required to be equal to or more stringent than federal maximum contaminant levels (mcl) for drinking water standards set by EPA. The points of compliance must be located so as to ensure the protection of all current and reasonably foreseeable future uses of the aquifer by the permittee.

- < **Partial Backfill Alternative.** Under this alternative, the APP requirements and potentially discharging facilities are identical to those identified for the Proposed Action alternative; therefore, post-Project groundwater quality is expected to continue to meet state aquifer water quality standards.
- < **No Action Alternative.** As there would be no mining activities or potentially discharging facilities permitted under this alternative, no impacts would occur to existing groundwater quality.

#### **4.3.2.6 Surface Water**

##### **4.3.2.6.1 Surface Water Quantity**

- < **Proposed Action Alternative.** The focus of surface water quantity analysis is the Gila River, Bonita Creek (as the City of Safford's primary drinking water source), the ephemeral drainages within the project area, and the artesian well at Watson Wash. Long-term, direct, potential impacts to surface flows in the Gila River could result from two sources: 1) predicted drawdown in the regional groundwater flow system (see Section 4.3.2.5.1) as a result of Project groundwater pumping; and 2) reduced volume of surface water discharged from drainages tributary to the Gila River as a result of surface diversions and other environmental protection measures for surface water quality.

C **Gila River.** The model was also used to predict any potential impact of groundwater pumping and the mine pits on Gila River surface flow by calculating changes in groundwater flow to/from the river as a function of time. Over a 3,000-year simulation time, the model projected the maximum reduction in groundwater flow to the Gila River attributable to the Project to be approximately 34 af/yr at Year 450 (URS 2002a). When adjusted for the predicted effect of the pit lakes on groundwater flow (21 af/yr), the maximum reduction in groundwater flow to the Gila River is projected to be 55 af/yr at Year 450. After the maximum reduction in surface flow in Year 450, the impact of pumping on the river is predicted to decrease as shown in Figure 4-10.

Storm water management for the Project is also expected to reduce surface water flows of the Gila River. As a result of the Project's upstream diversions and other storm water management measures designed to meet PDSI's non-discharge facility Section 402 (AZPDES) permit requirements, annual storm water runoff to the Gila River is expected to be reduced by approximately 94 af/yr (see Table 4-9). This amount includes a reduction both in channel flows and in incidental sheet flow before it collects in channels.

Thus, the predicted annual total maximum impact to surface flows in the Gila River as a result of groundwater pumping and stormwater management is 149 af/yr, which is less than 0.01 percent of the historic median annual flow rate of 342,200 af/yr and less than 0.05 percent of the estimated long-term average base flow (Figure 4-11). This impact is miniscule and unmeasurable relative to the river's average annual flows. The amount of mine pumping is, at its peak, less than two percent of the average annual flow of the Gila River at the head of the valley. In addition, the location of the pumping is about seven miles from the river, so the effects of the 16 years of pumping will be spread out over centuries at the river (B. MacNish, pers. comm., 2002).

Table 4-9. Estimated Change in Average Annual Runoff to the Gila River as a Result of the Proposed Action Alternative

Wash	Existing Runoff (af/yr)	Estimated Runoff under Proposed Action Alternative (af/yr)	Net Change (af/yr)	Percent change
Coyote/Butler Wash	264	289	25	9.5%
Watson Wash	137	68	(69)	(50.4%)
Talley Wash	119	85	(34)	(28.6%)
Cottonwood/Peterson Wash	252	238	(14)	(5.6%)
Wilson Wash	80	80	0	0%
Lone Star	130	128	(2)	(1.5%)
<b>TOTAL</b>	<b>982</b>	<b>888</b>	<b>(94)</b>	<b>(10.4%)</b>

Source: Dames & Moore 1998

Despite these impacts being unmeasurable, PDSI proposes to fallow decreed farmland that it owns in the Safford Valley to offset predicted physical impacts to surface water flows in the Gila River. The net effect of this mitigation program (called the Alternate Year Fallowing Program, see Appendix F) would be to reduce consumptive use of river water that otherwise would be diverted for irrigation. The program calls for fallowing 200 acres each year in an alternating pattern to preserve the integrity of the decreed water right for agriculture. Based on recent per-acre consumptive use in the Safford Valley (2.4 af), fallowing 200 acres would result in reduced consumption of 480 af/yr of water from the Gila River. Because 480 af/yr is more than three times the maximum total predicted impact on Gila River flows of 149 af/yr

(Figure 4-12), it is expected that the following program as currently configured would be adequate even if the monitoring program and future model recalibration predict a higher impact. Should revised impact estimates exceed 480 af/yr, additional decreed farmland is available for fallowing to make up the difference. This fallowing program would be implemented in perpetuity and protected by placing deed restrictions on farmlands incorporated into the program. In light of overall effects to Gila River flows, no adverse impacts to holders of surface water rights, including Indian tribes, to the Gila River are expected.

- C **Bonita Creek.** The groundwater model predicts that Bonita Creek flows are also not measurably impacted by groundwater pumping (less than 0.1 af/yr). Figure 4-10 shows the predicted changes in surface flow in Bonita Creek over a 3,000-year simulation period. The capacity of the City of Safford's current drinking water system, which is currently operating near maximum (H. West, BLM, pers. comm.), would not be affected.
- < **Partial Backfill Alternative.** This alternative is expected to result in impacts to surface water quantity that are identical to those described under the Proposed Action alternative.
- < **No Action Alternative.** With no mining permitted under this alternative, no effects to existing surface water quantity of the Gila River, Bonita Creek, Watson Wash artesian well, or drainages on the project area are expected.

#### **4.3.2.6.2 Surface Water Quality**

- < **Proposed Action Alternative.** Surface water quality off the mine site is not expected to be adversely affected under the Proposed Action alternative because on-site and off-site surface water quality would be regulated by Sections 401 (State Water Quality Certification), 402 (AZPDES), and 404 of the CWA. Off-site drainage would be diverted around the Project by a series of stormwater diversion channels, thereby preventing stormwater from contacting mine facilities. As part of Section 402 compliance, stormwater that falls onto mine facilities and the project site would be retained on the mine site and not discharged. Stormwater facilities have been designed to retain the 100-year, 24-hour storm event, including a PLS draindown during a 24-hour power outage, a criterion that exceeds BADCT standards. Stormwater retained on-site would be routed into the process make-up water system.

PDSI is required to develop a spill and pollution prevention plan to minimize the probability of releasing process solutions in the environment during operations and to provide for the rapid detection and control of process solution seepage or accidental spill. The potential for a surface release of process solutions or hazardous materials does exist (however unlikely given the conservative design of the stormwater impoundment), and such a release could possibly affect surface water quality of the ephemeral drainages if such a release occurred during a storm event. The alkaline nature of the soils in the area would likely neutralize a release of PLS or sulfuric acid, and, given the approximately five-mile distance to perennial water (Gila River), it is unlikely that a such release would cause a water quality exceedance in the river.

Potential impacts to surface water quality from the Proposed Action include changes in sediment transport characteristics of some drainages as a result of the Project's stormwater management program. These impacts result from increased scour associated with diversions and detention of sediment in detention/retention basins. A sediment transport model (HEC-6) was constructed for drainages in which there was a potential for measurable increased channel scour as a result of the post-mine conditions (Dames & Moore 1999b). The model was used to estimate the extent of downstream scour as a result of increased flow velocities and shear forces in drainages with increased flows: E Wash, an unnamed tributary of Coyote Wash; Q Wash, an unnamed tributary of Peterson Wash; and Cottonwood Wash (see Figure 2-1). The model results for these three drainages show that equilibrium for sediment transport is re-established downstream at distances of about 1.0 mile for E Wash, 1.7 miles for Cottonwood Wash, and, 0.2 mile for Q Wash from their respective diversion outfalls (see Figure 4-13). All these equilibrium points are located within the mine site boundary; therefore, the effects of scouring are not expected to extend off-site (i.e., no scour effects on private or state lands south of the project area or at the Gila River) (Dames & Moore 1999b).

To estimate the impacts to sediment yield from the five largest washes in the project area, Dames & Moore (1996a) used the Pacific Southwest Inter-Agency Committee (PSIAC) method. Input parameters in this model include geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and transport. Based on the results of the model, the proposed stormwater management activities under the Proposed Action alternative are estimated to reduce the average annual sediment yield in some drainages by approximately nine percent (Table 4-10) of the existing yield, which could increase the potential for channel erosion (scour) during high flow events.

Table 4-10. Impacts to Average Annual Sediment Yield for Five Washes in the Project Area as a Result of the Proposed Action Alternative

Wash	Existing Sediment Yield (af/yr)	Estimated Sediment Yield for the Proposed Action* (af/yr)	Net Change (af/yr)	Percent Change
Coyote/Butler Wash	0.9	0.9	0.0	0%
Watson Wash	2.9	2.7	(0.2)	-7%
Talley Wash	1.3	0.9	(0.4)	-31%
Cottonwood/Peterson Wash	1.5	0.9	(0.6)	-40%
Wilson Wash	3.0	3.3	0.3	10%
<b>TOTAL</b>	<b>9.6</b>	<b>8.7</b>	<b>(0.9)</b>	<b>-9%</b>

\* Dames & Moore (1996a) evaluated average annual sediment yield under "post-project alternatives" A, B, C, and D. Alternative B was used as a proxy for the Proposed Action. Alternative C was assumed to be the Partial Backfill Alternative.

No impacts are expected to the quality of water in the Gila River from groundwater pollution because actions required to comply with APP regulations for development of the Proposed Action are expected to result in no exceedances of numeric aquifer water quality standards at or beyond those points (see Section 4.3.2.5.2) (the river is beyond the proposed points of compliance identified in PDSI's APP application).

- < **Partial Backfill Alternative.** Surface water quality off the mine site is not expected to be affected under the Partial Backfill alternative as on-site and off-site surface water quality would be regulated by Sections 401 (State Water Quality Certification), 402 (AZPDES), and 404 of the CWA. Under the Partial Backfill alternative, the diversion of flows into E Wash, Cottonwood Wash, and Q Wash would result in impacts to potential bed sediment erosion identical to those described under the Proposed Action alternative. Like the Proposed Action, the impacts of scour are not likely to be discernible off the mine site or at the Gila River (Dames & Moore 1999b).

To estimate the impacts to sediment yield from the five largest washes in the project area, Dames and Moore (1996a) used the Pacific Southwest Inter-Agency Committee (PSIAC) method. Input parameters in this model include geology, soils, climate, runoff, topography, ground cover, land use, upland erosion, and channel erosion and transport. Based on the results of the model, the drainage modifications under the Partial Backfill alternative are identical to those proposed for the Proposed Action and are also estimated to reduce average annual sediment yield by approximately nine percent (Table 4-10).

- < **No Action Alternative.** This alternative would not affect existing surface water quality of the project area because no surface disturbance activities would be permitted under this alternative.

#### 4.3.2.6.3 Pit Lakes

- < **Proposed Action Alternative.** During mining operations, precipitation, pit wall runoff, and groundwater entering the pits would be pumped out for use in the leaching process. Once mining is completed and the pits are no longer dewatered, a lake is expected to form in each pit. Mining the San Juan deposit would eliminate the existing pit lake, a positive impact because the pit lake that would form in the new San Juan pit at the close of operations would likely have much better water quality than the current pit lake (Water Management Consultants 1997).

After closure, the Project's stormwater diversion structures would continue to divert surface flows from entering the San Juan and Dos Pobres pits. Proposed structures that would affect the water quality of future pit lakes and their purposes are summarized below (Dames & Moore 1999b):

- C **West Diversion Channel to E Wash** (see Figures 2-11 and 2-12). This diversion is designed to reduce surface flow into the Dos Pobres pit and ponding against the West development rock stockpile.
- C **South Diversion Channel to Q Wash** (see Figure 2-13). This diversion is designed to reduce local flows into the San Juan pit.
- C **Peterson Wash Diversion Channel to Cottonwood Wash** (Figure 2-14). This diversion is designed to prevent Peterson Wash flows from entering the San Juan pit.

Water Management Consultants, Inc. (1997, 1998, 2002) evaluated the expected conditions in the San Juan and Dos Pobres ultimate pit lakes under the Proposed Action alternative. This evaluation is based upon 1) an estimate of the acid-generating potential of the wall rocks in the pits based on

acid-base accounting data, 2) an estimate of the leachate chemistry derived from interaction of simulated rain and rocks expected to occur in the pit walls based upon the results of EPA1312 testing, and 3) predictive modeling of the chemical load of the runoff from the high walls and influent groundwater chemistry (based on the results of the groundwater monitoring program) mixed in proportions defined by the water balance model (Water Management Consultants 2002). The following discussion of predicted pit lake evolution and water quality is from the report entitled "Updated Screening Level Pit Lake Evaluation at the Dos Pobres/San Juan Project" (Water Management Consultants 2002).

Mass balances for water and chemical constituents were conducted for each of the pits. Elements of the water balance for each pit were determined by application of physically realistic models using statistically representative weather records, surface runoff estimates calculated on an event-by-event basis, and numerical analysis of groundwater flow including unsaturated zone processes. Elements of the chemical mass balance for each pit were determined by associating constituent concentrations measured or estimated by laboratory testing with water volumes identified by the water balance calculations. Reactions between the constituents in the pit lakes were then simulated, and the process was repeated until a steady-state condition was reached. The steady-state condition represents the long-term physical and chemical characteristics of the pit lakes.

Results of the updated screen level pit lake evaluation for the Project indicate that both the Dos Pobres and San Juan mine pits will develop lakes after mine dewatering ceases (Figure 4-14). Water levels in the lakes are expected to stabilize at levels below the regional water table in the area, and therefore, the lakes will act as groundwater sinks with zero discharge to regional groundwater. Total groundwater inflow to the two pits at steady-state will be under 6 gpm. Under long-term conditions, runoff to the pits from pit highwalls and direct precipitation combined were found to contribute 92% and 98% of total inflow to the Dos Pobres and San Juan pits, respectively. The only outflow is expected to be pit lake evaporation. Accordingly, long-term chemistry of the lakes will be dominated by the quality of the inflowing waters as they reach kinetic equilibrium under the influence of evapoconcentration and precipitation.

The pit lake evaluation indicates that over the long-term, water quality of both pit lakes will meet both Aquifer Water Quality Standards (AWQS) and BLM standards for all regulated constituents, with the exception of thallium (see Table 4-11 and Figure 4-15). Modeling results for thallium concentrations are, however, deemed inconclusive since this constituent was below the detection limit of the analytical procedure (but the detection limit was higher than the standard). The low sulfide concentrations of the wall rocks of both the proposed pits and the abundance of carbonate minerals within the Safford Volcanics, and quartz monzonite prophyry, and the Gila Mountain Volcanics are expected to keep the pH of the water filling the pits at neutral. The results of the ABA and EPA 1312 tests and the screening level modeling results based upon these data support the conclusions that the predicted lake water for the two pits should be near neutral with a metals load within both BLM benchmark concentrations and AWQS.

**C San Juan Pit Lake.** At steady-state, the ultimate pit lake at San Juan is expected to be 150 ft deep, which corresponds to an elevation of 3,300 ft above mean sea level. The volume of groundwater intercepted by the pit at steady-state conditions is 0.64 af/yr, with groundwater inflow originating from the Safford Volcanics bedrock.



- C **Dos Pobres Pit Lake.** At steady-state, the ultimate pit lake at Dos Pobres is expected to be 200 ft deep, which corresponds to an elevation of 2,800 ft above mean sea level. The volume of groundwater intercepted by the pit at steady-state conditions is 7.8 af/yr, with groundwater flow originating from the Safford Volcanics and the Gila Mountain Volcanics bedrock reservoirs.

Table 4-11. PHREEQC Average Concentration 0-100 years Projected for the San Juan and Dos Pobres Pit Lakes Compared to Applicable Standards (all concentrations in mg/l, except pH, pe, and ionic strength)

Chemical	San Juan	Dos Pobres	AWQS	BLM Benchmark
Alkalinity	11.29	43.87		
Aluminum	0.00381	0.0106	--	21
Antimony	0.00253	0.00225	0.006	0.17
Arsenic	0.000397	0.0000216	0.05	0.94
Barium	0.71	0.55	2	--
Beryllium	0.000491	0.0000402	0.004	--
Cadmium	0.000653	0.000588	0.005	0.23
Calcium	12.3	22.93	--	--
Chloride	1.42	8.81	--	--
Chromium	0.0122	0.0066	0.10	--
Copper	0.015	0.00793	--	1.1
Fluoride	0.26	0.66	4	5.3
Iron	0.00111	0.000439	--	--
Lead	0.0000469	0.0000372	0.05	--
Magnesium	1.75	7.57	--	--
Manganese	0.023	0.0495	--	0.78
Mercury	0.000133	0.000143	0.002	0.002
Nickel	0.018	0.0232	0.10	--
pH	7.05	7.65	--	--
Potassium	13.91	10.39	--	--
Selenium	0.0121	0.00556	0.05	0.57
Silver	0.000735	0.00105	--	14
Sodium	30.96	41.19	--	--
Sulfate	106.75	128.83	--	--
Thallium	0.00332	0.00357	0.002	0.002
Zinc	0.0189	0.0272	--	0.834

Source: Water Management Consultants 2002

- < **Partial Backfill Alternative.** Under this alternative, the existing San Juan pit lake would also be eliminated, and the planned pit would be partially backfilled with 60-80 million tons of development rock, reducing the ultimate pit size to approximately 215 acres. Placement of development rock would occur in the western portion of the pit, at elevations of 3,650 feet above msl or higher. The pit lake is expected to ultimately stabilize at 3,300 feet above msl, 350 feet below the toe of the backfill development rock stockpile. Backfilling would therefore have no impact on the projected pit lake water quality or quantity as described above. Under the Proposed Action alternative, the predicted lake water is expected to be neutral (pH 7.05) and is not expected to be a threat to wildlife or the environment. The water quality and quantity of the anticipated pit lake at Dos Pobres is expected to be identical to that described under the Proposed Action alternative.
  
- < **No Action Alternative.** Under this alternative, the existing pit lake at San Juan would remain, and no pit lake would be expected to form at Dos Pobres since no further development of that orebody would occur. Over the long-term, the pit lake water at San Juan would likely remain of poor quality due to runoff from the historic process areas. In the very long-term, evapoconcentration of some chemical constituents of the pit lake may also occur, should the rate of evaporation exceed the rate of precipitation and groundwater inflow entering the San Juan pit.

#### 4.3.2.6.4 100-year Floodplains

- < **Proposed Action Alternative.** Under the Proposed Action, the hydrologic regime of several washes would be altered by the proposed construction of a series of retention, detention, and diversion structures designed to reduce run-on into the San Juan and Dos Pobres pits, leach pad, and development rock stockpiles; to reduce ponding against stockpiles; and to prevent release into surface waters of flows potentially impacted by leaching or mining operations. As summarized in Table 4-12, these structures would result in reduced peak flows in washes from which flows are diverted (F, G, Watson, Talley, Peterson) and increased peak flows in washes which receive diverted flows (E, E1, Q, and Cottonwood).

The FEMA 100-year floodplain delineation for the Gila River in the region of the project area is not expected to change as a result of the Proposed Action. For the washes with increased peak flows, the extent of scour was estimated by comparing pre- and post-mine flow velocities and shear forces. Conservative estimates of the extent of scour for E, Cottonwood, and Q Washes are distances of approximately 1.0 mile, 1.7 miles, and 0.2 mile, respectively. The Graham County landfill, located near the confluence of Peterson and Cottonwood Washes, is roughly 10 miles (52,800 feet) downstream of the West Diversion Outfall at Cottonwood Wash. This landfill, primarily used by the communities of Safford, Thatcher, and Pima, is not expected to be impacted by increased flows in Cottonwood Wash (Dames & Moore 1999b), as the estimated extent of increased scour is not expected to reach beyond approximately 1.7 miles below the diversion outfall (ibid.).

- < **Partial Backfill Alternative.** As the Partial Backfill alternative proposes identical retention, detention, and diversion structures, this alternative would result in direct and indirect impacts to 100-year floodplains that are identical to those described for the Proposed Action alternative.

Table 4-12. Estimated Range of Increases in Surface Water Flow in Nine Washes from the Proposed Action Alternative

Wash	Percent of Pre-Mine Peak Flow
F	26-73
G1	24-77
Watson	33-69
Talley	27-84
Peterson	25-73
E1	134
E	103-135
Cottonwood	137-151
Q	122-180

Source: Dames & Moore 1997c, 1998c.

- < **No Action Alternative.** This alternative would not affect 100-year floodplains within the project area as no activities would be permitted that impact drainages and their flows.

#### 4.3.2.6.5 Waters of the U.S.

- < **Proposed Action Alternative.** Within an approximately 16,625-acre study area that included the public and private lands proposed for mining use, 113.92 acres of waters of the U.S. and 0.03 acres of wetlands (at Cottonwood and Bryce Springs) have been delineated (SWCA 1997e) and approved by the COE as jurisdictional. Under this alternative, about 21.4 acres of jurisdictional waters within this study area would be directly impacted by mining and mining-related activities (Table 4-13). In addition, about 93.2 acres of jurisdictional waters, some within and some outside the study area, would be indirectly impacted. No impacts on the jurisdictional wetlands are expected. DP Seep, which lies within the project footprint and would be removed during mine elevation, does not meet the criteria to be considered a jurisdictional wetland.

Direct impacts to waters of the U.S. would result from excavation and fill activity in washes during construction of the stormwater diversion system and development of the mines. Functions of waters of the U.S., such as wildlife habitat and stormwater conveyance, are assumed to be completely lost in the 21.4 acres directly affected. Indirect impacts would result from downstream dewatering in washes losing diverted stormwater flow; from scour effects and some xeroriparian vegetation enhancement in washes receiving diverted flows; and from a reduction in overall watershed area due to mine development. Functions in these areas would not be reduced below values found in adjacent uplands (SWCA 1997g); therefore, maximum impact to the 93.2 acres indirectly affected is assumed to be 50 percent. Based on these assumptions, impacts to a total of 68 acres of jurisdictional water of the U.S. would have to be mitigated under Section 404 of the CWA. The proposed mitigation—creation of 30 acres of riparian habitat, enhancement of 18 acres of riparian and wetland

habitat, and preservation of 160 acres of riparian habitats along the Gila River—is presented in Appendix F.

- < **Partial Backfill Alternative.** The backfilling into the San Juan pit with nearly 27 percent of the development rock generated by the Project results in reduced height of the development rock stockpiles rather than reduced footprints. Therefore, this alternative is expected have direct and indirect impacts on waters of the U.S. to the same degree as the Proposed Action alternative.
- < **No Action Alternative.** This alternative proposes no activities that would result in direct or indirect impacts to waters of the U.S.

Table 4-13. Impacts to Waters of the United States Resulting from the Proposed Action	
Activity	Impacted Acreage
<b>Direct Impacts</b>	
Fill	16.5
Excavation	4.9
<b>Indirect Impacts</b>	
Scour	3.0
Upstream Diversions <sup>1</sup>	4.1
Downstream Diversions <sup>2</sup>	82.9
Other Impacts	3.2
<b>TOTAL</b>	<b>114.6</b>

<sup>1</sup> Upstream diversions refer to waters impacted by the upstream diversion ditch and occur between the mine facilities and upstream diversion ditches.

<sup>2</sup> Downstream diversions refer to jurisdictional arroyos on the downstream side of the mine that are dewatered at the downstream extent of direct impact acres.

### 4.3.3 Biological Resources

#### 4.3.3.1 Vegetation

**4.3.3.1.1 Proposed Action Alternative.** The Proposed Action alternative is expected to result in direct impacts to three of the four upland vegetation communities on public lands in the project area: 1) Sonoran Desertscrub, 2) Sonoran Desertscrub/Semidesert Grassland ecotone, and 3) Disturbed Land. The fourth upland community, Semidesert Grassland, grows at elevations above the planned mining activities and would probably not be affected. Upland vegetation on the mining site would be cleared or grubbed to construct pits, stockpiles, leach pad, haul and access roads, shops, stormwater diversions, and other facilities. Some native cacti, primarily barrel cactus, may be salvaged for revegetation/reclamation purposes. Some (unquantified amount) Xeroriparian Mixed Scrub growing along washes would be disturbed by the stormwater diversions,

both by construction activities and the dewatering of some drainages. Riparian vegetation associated with perennial springs is not expected to be directly or indirectly impacted by the Project.

Table 4-14 summarizes the direct impacts of the Proposed Action alternative on the six habitat types occurring in the project area. These values (in acres) are based on the impact calculations provided in Chapter 2 for the various mine facilities proposed under this alternative. Approximately 60 percent of the affected vegetation grows on BLM-administered public lands; 40 percent on PD property.

Table 4-14. Acres of Vegetation Communities Expected to Be Impacted by the Proposed Action Alternative

	Sonoran Desertscrub	Semidesert Grassland	Sonoran Desertscrub- Semidesert Grassland	Disturbed	Xeroriparian Mixed Scrub	Riparian at Springs	TOTAL
BLM Land	527	0	1,220	184	unquantified	0*	1,931
PD Land	290	0	1,026	113	unquantified	0*	1,429
<b>TOTAL</b>	<b>817</b>	<b>0</b>	<b>2,246</b>	<b>297</b>	<b>unquantified</b>	<b>0*</b>	<b>3,360</b>

\* No direct or indirect impacts are expected.

While loss of vegetation under the stockpiles and leach pad would be permanent, other areas, such as the side slopes and tops of the development rock stockpiles and the leach pad, would be reclaimed and revegetated to provide invasive, nonnative plant species control, erosion control, and slope stability (see Section 2.1.2.4 in Chapter 2). PDSI would evaluate, as part of project development activities, opportunities for salvaging native cacti to be used for on-site revegetation.

**4.3.3.1.2 Partial Backfill Alternative.** This alternative would result in direct and indirect impacts identical to those described under the Proposed Action alternative.

**4.3.3.1.3 No Action Alternative.** Under the No Action alternative, no mine-related impacts to vegetation resources on the project area would occur.

#### 4.3.3.2 Wildlife Resources

**4.3.3.2.1 Proposed Action Alternative.** Due to the loss of habitats (i.e., vegetation communities) in the project area resulting from construction of mine facilities, the Proposed Action alternative is expected to indirectly affect some wildlife, including nongame birds, smaller mammals, herptiles, and invertebrates, as well as game species such as mule deer, collared peccary (javelina), mountain lion, doves, and quail. Animals affected by loss of habitat are expected to move to suitable habitat in the vicinity of the project area. Table 4-15 gives the estimated number of mule deer and javelina that could be impacted under this alternative based on density estimates provided by the Arizona Game and Fish Department (AGFD) for the project area. Impact

to big game species on public lands would, in turn, affect recreational hunting use of this portion of AGFD Hunt Unit 28.

Table 4-15. Estimated Number of Mule Deer and Javelina in the Project Area Impacted as a Result of the Proposed Action Alternative (based on AGFD density estimates)		
	Mule Deer (4 to 7/sq mi)	Javelina (1.5 to 3/sq mi)
BLM Land	12 to 21	5 to 9
PD Land	8 to 14	3 to 6
<b>TOTAL</b>	<b>20 to 35</b>	<b>8 to 15</b>

Wildlife may be disturbed by human activity (e.g., noise, vibration, traffic, nighttime light, etc.) on the project site, causing animals to move away from the area. Some animals, especially small burrowing animals, may be injured or killed by construction and mining activities. Increased traffic on roads may also result in injury or death of wildlife.

Creation of pit lakes is not expected to significantly affect wildlife. Larger terrestrial species would be prevented from gaining access to the pit lakes by fencing proposed to meet safety objectives and provide site security. Some birds could occasionally use the pit lakes for resting, and bats could forage over them for insects and drink from them. Such activity is not expected to adversely impact these animals because “long-term simulation of the pit water quality indicates that given the neutralizing capacity of the exposed rocks [in the Dos Pobres pit], and the slightly alkaline groundwater inflow, the pit lake water would most likely remain neutral. No adverse effect to...avian species is anticipated” (Water Management Consultants 1997). For the San Juan pit lake, “the predicted lake water is not considered a threat to wildlife or the environment in the long term” (ibid.).

The excess process solution impoundment at the downgradient toe of the leach pad would also be located within the fenced active mine site. However, the surface of the impoundment would be exposed and accessible to birds and bats. PLS is acidic (generally with a pH below 2.0) and toxic, typically containing high concentrations of total dissolved solids, heavy metals, and sulfates (see Table 4-16 for chemical composition of PLS for the Project as compared to BLM benchmark standards for wildlife). Unlike cyanide ponds at gold mines that have been associated with adverse impacts on wildlife, PLS impoundments are brightly colored and have an acidic/acrid odor. Anecdotal information from wildlife agency personnel and mine personnel suggests that there is little in or around active PLS ponds adjacent to SX/EW facilities to attract birds or bats to rest in, drink from, or forage over the ponds and indicates that wildlife impacts from exposure to active PLS ponds at other copper mines in Arizona have not been documented (T. Hughes, BLM, pers. comm.; L. Thrasher, BLM, pers. comm.; R. Haughey, AGFD, pers. comm.; K. King, USFWS, pers. comm.; J. Korolsky, PDSI, pers. comm.). However, PDSI will monitor potential wildlife use of the excess process solution impoundment and implement appropriate mitigation measures if warranted. PDSI is currently evaluating engineering designs for potential mitigation.

After major storm events, the stormwater impoundment would likely contain runoff, including diluted PLS, from the areas upgradient of it. Because this is expected to occur infrequently, and on these occasions the

impoundment would be drained as soon as practicable, the stormwater impoundment is expected to rarely attract wildlife.

Table 4-16. Data on Chemical Composition of Pregnant Leach Solution (PLS) from Ongoing Column Leach Tests for Dos Pobres/San Juan Project Compared to BLM Benchmark Standards

	Units	PLS Characteristics	BLM Benchmark Standards for Wildlife
<b>General Parameters</b>			
pH	-	1.52-2.70	-
Total Dissolved Solids	mg/L	44000-57000	-
Fluoride	mg/L	<1.0	5.3
Sulfate	mg/L	34000-41000	-
<b>Trace Metals, Total Dissolved</b>			
Aluminum	mg/L	3400-4000	21
Antimony	mg/L	<1.0	0.17
Arsenic	mg/L	<1.0	0.94
Barium	mg/L	<0.1-0.55	-
Beryllium	mg/L	<0.50	-
Cadmium	mg/L	6.7-7.8	0.23
Chromium	mg/L	0.98-2.6	-
Copper	mg/L	1100-2800	1.1
Iron	mg/L	150-3100	-
Lead	mg/L	<1.0	-
Manganese	mg/L	240-300	0.78
Mercury	mg/L	<0.002	0.002
Nickel	mg/L	2.7-4.8	-
Selenium	mg/L	<1.0	0.57
Silver	mg/L	<0.50	14
Thallium	mg/L	<2.0	0.002
Zinc	mg/L	470	0.834

Source of PLS Data: J. Korolsky, PDSI, pers. comm.

< Number = Below detection limit

**4.3.3.2.2 Partial Backfill Alternative.** This alternative would result in impacts to wildlife that are identical to those of the Proposed Action alternative.

**4.3.3.2.3 No Action Alternative.** This alternative would have no direct or indirect effects on wildlife or wildlife habitats.





#### 4.3.3.3 Special Interest Species

##### 4.3.3.3.1 Threatened and Endangered Plants

- < **Proposed Action Alternative.** No known listed, proposed, or candidate threatened or endangered plant species are likely to be directly or indirectly impacted under this alternative. The BLM undertook a Section 7 consultation with the USFWS for the Arizona hedgehog cactus after a morphologically similar cactus was found in the project area. Consultation was concluded on June 11, 2002, with the issuance of a biological opinion that the Project would not affect the Arizona hedgehog cactus because the hedgehog cacti within the action area are not the listed entity (USFWS 2002).
- < **Partial Backfill Alternative.** The effects of this alternative on threatened and endangered plants would be identical to those described under the Proposed Action alternative.
- < **No Action Alternative.** This alternative would not impact threatened or endangered plant species.

##### 4.3.3.3.2 Threatened and Endangered Animals

- < **Proposed Action Alternative.** No threatened or endangered animal species are likely to be directly or indirectly impacted by the Proposed Action alternative. The project area does not provide suitable habitat for any listed, proposed, or candidate animal species, nor have any individuals of such species been recorded from the site (Table 4-17).

Suitable habitat for the species listed in Table 4-17 exists along the Gila River south of the project area, and/or along Bonita Creek, east of the project area. Southwestern willow flycatchers inhabit riparian vegetation bordering the Gila River, and yellow-billed cuckoos and Gila chub are known from Bonita Creek. Bald eagles are expected to occur infrequently in both areas. Razorback sucker, spikedace, loach minnow, and cactus ferruginous pygmy-owl are unlikely to occur, even though reintroduction of the razorback sucker into Gila River was attempted in the 1980s. None of these species or suitable habitat for these species is expected to be affected by the Project because the potential for reduction in flow in the Gila River as a result of the Project would be mitigated by the Alternate Year Fallowing Program described in the Mitigation and Monitoring Plan (Appendix F), and model-predicted project impacts on flow in Bonita Creek are nearly zero.

Gila topminnow has been documented in the outflow area from an artesian well in Watson Wash southwest of the project area but has not been found in the last two annual surveys (B. Robles, BLM, pers. comm. 2002). This species may be extirpated from the site, possibly because of competition from mosquito fish, a non-native species first observed at the well in 1999 (ibid.). Groundwater modeling has predicted that groundwater pumping at the Project could reduce wellhead pressure at the Watson Wash well by 0.72 foot at 1200 years after Project initiation (Sinton 2002). Mitigation plans consist of regularly monitoring wellhead pressure and, if a reduction in water flow is observed in "early warning" monitoring wells, reducing the height of the well's discharge pipe to maintain flow pressure. Suitable habitat would be preserved to support the Gila topminnow.

Table 4-17. Summary of Anticipated Impacts of the Proposed Action Alternative on Threatened or Endangered Animal Species Potentially Occurring Near the Project Area

Species	Status*	Direct and Indirect Impacts
Bald eagle	T	No direct or indirect impacts expected
Cactus ferruginous pygmy-owl	E	No direct or indirect impacts expected
Gila chub	PE	No direct or indirect impacts expected
Gila topminnow	E	No direct or indirect impacts expected
Loach minnow	T	No direct or indirect impacts expected
Razorback sucker	E	No direct or indirect impacts expected
Southwestern willow flycatcher	E	No direct or indirect impacts expected
Spikedace	T	No direct or indirect impacts expected
Yellow-billed cuckoo	C	No direct or indirect impacts expected

\* E = endangered; T = threatened

In its biological opinion, the USFWS concurred with the BLM determination that the Project may affect but is not likely to adversely affect the Gila topminnow, razorback sucker, spikedace, and loach minnow. Regarding the southwestern willow flycatcher, the USFWS rendered the opinion that the Project, as proposed, is not likely to jeopardize the continued existence of the species (USFWS 2002).

- < **Partial Backfill Alternative.** The effects of this alternative on threatened or endangered animals would be identical to those described under the Proposed Action alternative.
- < **No Action Alternative.** This alternative would result in no direct or indirect impacts to threatened or endangered animal species.

**4.3.3.3 Critical Habitat.** No proposed or designated critical habitat for any listed or proposed threatened or endangered species occurs in the project area.

- < **Proposed Action Alternative.** No designated critical habitat for listed species would be directly impacted by the Project. It is unlikely that critical habitat for the razorback sucker in the Gila River south of the project area, or critical habitat for the loach minnow and spikedace in the Gila River and Bonita Creek east of the project area, would be indirectly impacted by predicted reductions in flows resulting from groundwater pumping and stormwater diversions at the Project. Effects on Bonita Creek flows are predicted to be nearly zero, and the potential for an indirect impact on the Gila River would be mitigated by implementation of the Alternate Year Fallowing Program described in the Mitigation and Monitoring Plan (Appendix F). In its biological opinion, the USFWS determined that the Project may affect but is not likely to adversely affect designated habitat for the razorback sucker, spikedace, and loach minnow (USFWS 2002).
- < **Partial Backfill Alternative.** The effects of this alternative on critical habitat would be identical to those described under the Proposed Action alternative.

- < **No Action Alternative.** No designated critical habitat would be affected by this alternative.

**4.3.3.3.4 BLM Sensitive Species.** One BLM sensitive plant species (Pima Indian mallow) and four BLM sensitive animal species (California leaf-nosed bat, Townsend's big-eared bat, cave myotis, and Gila monster) are known or likely to occur regularly in the project area. Eleven additional BLM sensitive species (northern goshawk, ferruginous hawk, common black-hawk, yellow-billed cuckoo, burrowing owl, small-footed myotis, long-legged myotis, fringed myotis, Yuma myotis, Allen's big-eared bat, and greater western mastiff bat) may occasionally visit the project area. One other BLM sensitive species, Gila chub, is known to occur nearby.

- < **Proposed Action Alternative.** The known population of Pima Indian mallow grows outside areas that would be impacted by the proposed Project. Most of these areas do not appear to contain suitable habitat for the plant, although a comprehensive survey for Pima Indian mallow was not conducted (SWCA 1997a). No direct or indirect impacts to this species are anticipated; nor are impacts expected to California leaf-nosed bat, Townsend's big-eared bat, or cave myotis. All existing mine features known to be used by these bats (sites 3, 5, 6, 13, 20, and 21) or that appear to be potential roosting habitat for them (sites 1, 9, 10, 11, and 19) lie outside areas of potential disturbance (see Figure 3-13), and bats are unlikely to be attracted to or use solution ponds for drinking or foraging. Suitable habitat for the Gila monster is present on both BLM and PD lands in areas that would be affected by mining-related activities. It is likely that an undetermined number of individuals of this species would be lost under this alternative; however, the impact is not likely to lead to loss of population viability or extirpation of the Gila monster from the general area. The 11 species that occasionally may visit the project area are likely to appear irregularly, if at all; therefore impacts to these species are not expected. Chiricahua leopard frog is known to occur along the Gila River but is not expected to be impacted for the reasons given in Section 4.3.3.3.2. Gila chub is known to occur in Bonita Creek, where no significant impacts to surface water flows are expected.
- < **Partial Backfill Alternative.** The effects of this alternative on BLM sensitive species would be identical to those described under the Proposed Action alternative.
- < **No Action Alternative.** This alternative would result in no direct or indirect impacts to BLM sensitive species.

#### 4.3.3.4 Biodiversity

**4.3.3.4.1 Proposed Action Alternative.** As measurements of biodiversity are scale-dependent, so too would be the Project's impacts on biodiversity. Although there is no question that biodiversity of land directly impacted by the Project, such as mining pit sites, would be significantly reduced, the overall biodiversity of the region, even of public lands in the project area, would not be affected. The population viability of species of plants and animals in the area would not likely be affected in either the short or long term by the Project; therefore, this alternative is not expected to adversely affect biodiversity.

**4.3.3.4.2 Partial Backfill Alternative.** Impacts to biodiversity of the region from this alternative would be identical to those described under the Proposed Action alternative.

**4.3.3.4.3 No Action Alternative.** This alternative would maintain the *status quo* of the subject lands and would have no direct or indirect impacts on the biodiversity of the project area or of the surrounding region.

## 4.3.4 Cultural Resources

### 4.3.4.1 Historic and Prehistoric Archaeological Resources

**4.3.4.1.1 Proposed Action Alternative.** The Proposed Action would destroy or damage 37 of the 115 archaeological sites located in the project study area (see mitigation described in Table 4-45 at the end of this chapter). Of the affected sites, 13 are located on BLM-administered federal lands and 24 are on PD-owned land. For their scientific value, 36 of these sites are recommended to be eligible for nomination to the National Register of Historic Places (National Register). Of these 36 sites, 18 are prehistoric, 10 are historic, 4 are multicomponent, and 4 are sites of unknown temporal association. Table 4-18 lists the site numbers of both the eligible and ineligible sites.

Table 4-18. Archaeological Sites that Would be Directly Impacted by the Proposed Action Alternative

Federal Lands			PD Lands		
Sites Recommended as Eligible for the National Register for Their Scientific Values					
AZ CC:2:148	AZ CC:2:193	AZ CC:2:150	AZ CC:2:162	AZ CC:2:168	AZ CC:2:257
AZ CC:2:149	AZ CC:2:197	AZ CC:2:156	AZ CC:2:163	AZ CC:2:169	AZ CC:2:258
AZ CC:2:151	AZ CC:2:204	AZ CC:2:157	AZ CC:2:164	AZ CC:2:241	AZ CC:2:259
AZ CC:2:152	AZ CC:2:213	AZ CC:2:158	AZ CC:2:165	AZ CC:2:242	AZ CC:2:269
AZ CC:2:191	AZ CC:2:215	AZ CC:2:159	AZ CC:2:166	AZ CC:2:245	AZ CC:2:274
AZ CC:2:192	AZ CC:2:225	AZ CC:2:160	AZ CC:2:167	AZ CC:2:252	AZ CC:2:277
Sites Recommended as Ineligible for the National Register for Their Scientific Values					
AZ CC:2:206					

Project components that would damage or destroy archaeological sites include the Dos Pobres and San Juan pits, West and East development rock stockpiles, leach pad, crusher facility, aggregate source pit, San Juan soil stockpile, West Diversion Channel, Peterson Wash Diversion, four transmission lines, two roads, and activity in the Site #1 area. Many of the 37 sites could be avoided by judiciously positioning transmission line components, realigning roads, and repositioning the soil stockpile.

**4.3.4.1.2 Partial Backfill Alternative.** This alternative would result in impacts to archaeological sites that are identical to those described under the Proposed Action.

**4.3.4.1.3 No Action Alternative.** The No Action alternative would not affect historic and prehistoric archaeological resources in the project area. No mining would be authorized; therefore, none of the 115 sites in the project area would be physically impacted by mining. Other federal management actions may apply.

#### 4.3.4.2 Traditional Cultural Properties Identified by Indian Tribes

**4.3.4.2.1 Proposed Action Alternative.** Indian tribes consulted for this project generally opposed the proposed undertakings and consider 76 of the 115 archaeological sites in the project area to be places of traditional importance (see Table 3-20). The BLM and Arizona State Historic Preservation Office have yet to determine whether these properties are eligible for the National Register for their traditional values (i.e., as Traditional Cultural Properties) as well as their scientific values. The Proposed Action would damage or destroy 26 of these properties, 10 on federal lands and 16 on PD lands (Table 4-19). Eight of these sites are composed of petroglyph and cupule boulders. At the request of the Four Southern Tribes, all eight petroglyphs/cupule boulders will be relocated as a part of mitigation after full recording of the sites (SWCA 2000, 2003b).

Three sites (AZ CC:2:200, 211, and 234) are considered sacred: AZ CC:2:200, 211, and 234 are considered sacred by two by the White Mountain Apache Tribe and AZ CC:2:200 and 211 are considered sacred by the Tohono O'odham Nation, Hopi Tribe, and the Ak-chin, Gila River, and Salt River Pima-Maricopa Indian Communities. These sites are located on federal land and treatment must be consistent with Executive Order 13007 "Indian Sacred Sites," May 24, 1996. This order requires federal agencies to "to the extent practicable and not clearly inconsistent with essential agency functions, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites."

Table 4-19. Sites Identified by Indian Tribes as Being Places of Traditional Importance That Would Be Directly Impacted by the Proposed Action Alternative

Federal Lands			PD Lands		
AZ CC:2:148	AZ CC:2:192	AZ CC:2:150	AZ CC:2:164	AZ CC:2:257	
AZ CC:2:149	AZ CC:2:193	AZ CC:2:156	AZ CC:2:166	AZ CC:2:259	
AZ CC:2:151	AZ CC:2:213	AZ CC:2:157	AZ CC:2:168	AZ CC:2:269	
AZ CC:2:152	AZ CC:2:215	AZ CC:2:158	AZ CC:2:169	AZ CC:2:274	
AZ CC:2:191	AZ CC:2:225	AZ CC:2:159	AZ CC:2:241		
		AZ CC:2:160	AZ CC:2:45		

The three sacred sites, AZ CC:2:200, 211, and 234, will be avoided. To further protect AZ CC:2:200, PDSI revised its site development plan to provide a protective buffer zone around the site to exclude mining operations and will construct a fence around AZ CC:2:211 to protect the site from mining operations. Furthermore, PDSI will also provide access to the sites for representatives from appropriate Indian tribes for ceremonial purposes; therefore, sites AZ CC:2:200, 211, and 234 are not likely to be adversely affected by the Proposed Action.

**4.3.4.2.2 Partial Backfill Alternative.** Impacts to traditional cultural properties under this alternative would be identical to those described under the Proposed Action.

**4.3.4.2.3 No Action Alternative.** Under this alternative, mining would not be authorized; therefore, none of the sites in the project area identified as being traditional cultural properties and/or sacred sites by Indian tribes would be physically affected by mining.

### 4.3.5 Socioeconomic Resources

Impacts of the mine plan alternatives set on the socioeconomic resources of the region are expected to be concentrated in the Safford/Thatcher/Pima corridor (referred to here as the Safford area) of Graham County, primarily in the City of Safford itself. The nature, timing, and magnitude of these impacts would reflect the Dos Pobres/San Juan Project's two major phases: the initial 15-month construction phase and the long-term, 16-year production phase (ESI 1997).

#### 4.3.5.1 Population and Demographics

**4.3.5.1.1 Proposed Action Alternative.** The Proposed Action is expected to result in 145 new households, or 448 additional people, in Graham County. Of these new households, an estimated 108 would be associated with direct employment at the Project during its operational phase. The remaining 37 would result from indirect employment opportunities generated by the Project (see Section 4.3.5.2.1, Employment) (ESI 1997). Table 4-20 gives the percent growth represented by these figures for three areas: Graham County; the Safford area (Incorporated Safford, Thatcher, and Pima combined); and the City of Safford alone. An estimated 67 percent of all growth is expected to occur within the Safford city limits (see Section 4.6.1.3.1, Housing). Growth information is provided in Table 4-20 for both households and population. The year 1995 was chosen as the base year for this analysis because a special census was conducted in that year.

Table 4-20. Estimated Percent Increase in the Number of Households and Population of Graham County, the Safford Area, and the City of Safford Attributable to the Proposed Action

Area	No. Of Households (1995)	Percent Growth in No. of Households	Population (1995)	Percent Growth in population
Graham County	9,937	1.5%	29,772	1.5%
Safford Area	5,455	2.7%	14,580	3.1%
City of Safford	3,468	4.2%	8,773	5.1%

This table shows that the Proposed Action alternative would result in an estimated growth in the population of the Safford area of about 3.1 percent. Safford itself is likely to see an increase closer to 5.1 percent (assuming that Safford sees two-thirds of the growth). Graham County, having the largest base population, would be impacted the least, with an estimated increase of only 1.5 percent.

The State of Arizona Department of Economic Security has projected the overall population growth in Graham County for the years 1995-2005. They expect the county to grow by 2,466 households, or 8,553 individuals, a robust increase of 24.8 percent and 28.7 percent, respectively. The Dos Pobres/San Juan Project's

estimated contribution of 145 new households and 448 individuals (ESI 1997) represents only about 5.9 percent and 5.2 percent, respectively, of this projected growth.

- < **Minority Groups and Low-Income Populations.** Like the general population, minority groups in the Safford area are expected to benefit from the Proposed Action, which would provide additional opportunities for short-term jobs during the project construction phase and long-term jobs during the production phase. The Project would generate, either directly or indirectly, an estimated total of 644 new jobs in the Safford area by Year 16 of the Project (see Section 4.3.5.2.1, Employment). It is expected that this employment would reflect the demographic profile of the Safford area, including representative numbers from minority and low-income populations (ESI 1997). PDSI itself is expected to hire approximately 80 percent of its projected 250-person labor force locally, paying an average salary of approximately \$36,000 (1997 dollars). Approximately 80 percent of these relatively high-paying jobs are classified as “laborer,” a category that does not necessarily require specialized skills or extensive formal education—prerequisites that often function as barriers to employment for members of disadvantaged groups. Indirect employment from the Project is expected to be concentrated in the retail and service sectors, where jobs tend to be low-paying but require relatively low levels of formal education. These jobs may be filled disproportionately by individuals from minority or low-income populations.

Most of the increased employment opportunities under the Proposed Action would be located in the Safford area, which includes relatively high proportions of Hispanic and low-income households (see Section 3.2.5.1.1, Minority Groups and Low-Income Populations). Safford is close (within 10 miles) to the communities of Solomon, San Jose, and Sanchez, which are heavily Hispanic. However, Safford is relatively far (about 30 and 50 miles, respectively) from Bylas and Periodot, the major Native American population centers in the county.

**4.3.5.1.2 Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

**4.3.5.1.3 No Action Alternative.** The No Action alternative would not cause any change in the population size and demographics of Graham County. Population would continue to grow in the Safford area as a result of factors other than mining (e.g., increased tourist-based business, influx of retirees, etc.).

#### **4.3.5.2 Local and Regional Economy**

##### **4.3.5.2.1 Employment**

- < **Proposed Action Alternative.** The Proposed Action is expected to result in a more diversified local economy by adding mining-related jobs to the mix, increasing non-agricultural wage and salary employment by an estimated 9.0 percent over 1996 levels.

**C Direct Employment.** Under the Proposed Action alternative, employment during the construction phase of the Project is expected to range from 150 full-time jobs in the first month to a peak of 980 full-time jobs in the eighth month, declining to 50 jobs in the last (fifteenth) month. The average construction employment for the Project would be

approximately 470 workers (PDSI 1996). Potential construction firms have indicated that the Safford/Thatcher and Clifton/Morenci areas could possibly supply up to 40 percent of the needed construction workers (ESI 1997). Given these estimates, an estimated 390 temporary jobs could be filled by the local labor force. The availability of construction jobs would likely reduce the unemployment figure in the Safford area, which currently stands at 7.1 percent (about 240 individuals), but by an undeterminable number that depends in part on the suitability of unemployed individuals at the time of recruitment.

The operational phase of the Project is anticipated to begin in the twelfth month of the 15-month construction schedule (ESI 1997). Once fully operational, the Project as described in the Proposed Action alternative is expected to provide approximately 250 direct, full-time, salaried jobs. This figure may be higher at periods of maximum production. The three general categories of jobs that would be filled and the number of jobs they comprise are shown in Table 4-21.

Table 4-21. Breakout of Types of Employee Positions under the Proposed Action Alternative

Employee Category	Number of Positions	Percent of Total
Administrative (supervisory, clerical, and support staff)	29	12%
Technical (engineering)	20	8%
Labor (craftsmen, operators, skilled and general laborers)	201	80%

Source: ESI 1997, Table II-13

PDSI expects about 80 percent of the workforce to be local hires from Graham and Greenlee counties, including the communities of Bylas, Fort Thomas, Pima, Central, Thatcher, Safford, Solomon, San Jose, York, Clifton, Morenci, and Duncan. The other 20 percent are expected to come from outside the region. Workers drawn from the outside would most likely bring needed technical, journeyman-level skills in specific mining-related trades (ESI 1997).

The majority of new local employment would likely come from the Safford area, the region's largest population center. These employees would include entry-level workers, individuals currently numbered among the County's unemployed, and individuals currently holding other jobs who would prefer higher-paying mining jobs (ESI 1997). It is unknown what proportion of new local hires would come from each of these sources; therefore, the magnitude of the Proposed Action's impact on the area's unemployment figure or on the distribution of labor among economic sectors is also unknown. Most new local hires would fall into the PDSI "labor" category, many requiring little if any mining experience.

It is expected that an undetermined number of experienced mine workers would transfer to the Project from PD's Morenci (PDMI) operation. A portion of such workers currently living in the Clifton/Morenci area may elect to stay there and commute to their new jobs, thus



lessening the impact of their employment on the Safford area's economy. It is likely, however, that some transfers from PDMI to PDSI would come from the approximately 32 percent of PDMI workers who already live in the Safford area and now commute to Morenci. Vacancies in the Morenci operation would likely be filled from the approximately 3,000 active applications normally on file with PDMI. Other than this shift in personnel, the socioeconomic conditions in Greenlee County should remain unaffected by the Proposed Action (ESI 1997).

In addition to the salaried workforce, PDSI estimates that local contractors would employ 100 workers to provide certain maintenance and fabrication services over the life of the Project. The four types of jobs that would be filled by contracted labor is shown in Table 4-22. PDSI also plans to hire an average of 15 college students for 10-12 weeks each year in a 40-hour-per-week summer internship program (ESI 1997).

Table 4-22. Breakout and Estimated Hourly Wages of Anticipated Contract Workers for the Project under the Proposed Action Alternative

Worker Category	Estimated Percentage of Total	Estimated Hourly Wage
Supervisor	10%	\$20-22
Craftsman	25%	\$12-13
Helper	25%	\$8-9
Laborer	40%	\$6-7

Source: ESI 1997

- C Indirect employment.** Direct employees, both salaried PDSI employees and contract workers, would generate a demand for goods and services that would lead to additional, or indirect, employment across all sectors of the region's economy. Local expenditures by PDSI for goods and services to support project operations would also result in a certain amount of indirect employment. PDSI is expected to spend approximately \$103,000,000 in local expenditures over the life of the project (ESI 1997, Table II-18a).

Because Safford is already the region's service center, and because most of the new PDSI employees would probably live in the Safford area, that community is expected to be the locus for the increased demand. The multiplier effect of the direct employment in this case is expected to be fairly high, from 1.74 to 1.84 (ESI 1997). Consequently, the direct employment of 350 workers (250 salaried PDSI employees plus 100 contract workers) is expected to generate a total employment of 623 by Year 7 of the Project; 634 by Year 12; and 644 by Year 16. Currently, wage and salary employment in Graham County as a whole totals 7,100. The largest share of the new indirect employment (294 by Year 16) would likely occur in Safford's retail and service sectors. The most pronounced consequences of the overall increased employment would be a proportional increase in demands on housing, schools, and utilities in the Safford area (ESI 1997).

- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.
- < **No Action Alternative.** The No Action alternative would not cause any change in employment figures in the Safford area or in Graham County as a whole.

#### 4.3.5.2.2 Income

- < **Proposed Action Alternative.** This alternative would result in increased income for the workers who shift from low-paying jobs (which are typical in the Safford area) to higher-paying construction- and mine-related work. The overall income from the increased direct and indirect employment generated by the Dos Pobres/San Juan Project would inject relatively large amounts of money into the local economy.

The construction payroll over the 15 months needed to reach full project build-out is estimated to total \$25,285,000 (1997 dollars). Once the mines are operational, the PDSI payroll for salaried workers is estimated to average \$9.0 million per year, totaling \$144 million over the 16-year production life of the Project. The payroll for contract workers is estimated at \$2.5 to \$3.0 million per year, for a total of \$44 million over the life of the Project. The internship payroll would range from \$60,000 to \$72,000 each year, for a total of \$0.96 million to \$1.15 million. Consequently, from the beginning of the construction phase to the end of the projected life of mining operations, PDSI would pay its direct and contracted employees well over \$214 million in wages (ESI 1997).

The average annual direct (unfringed) income of a PDSI salaried worker is expected to be \$36,000 (1997 dollars) (ESI 1997). This would be a high-paying job for a member of the Graham County labor force. Assuming one PDSI employee per household, and no other source of income in the household (a conservative assumption), an annual income of \$36,000 compares very favorably to the current median household income in Graham County of \$18,455.

The hourly wages for the estimated 100 contract workers are reported in Table 4-22. According to this estimate, 65 percent of these workers would be paid between \$6 and \$9 per hour, which, if annualized based on a full-time, 40-hour-week, would come to between \$12,480 and \$18,720 per year. The highest-paid 10 percent of the workers would earn between \$41,600 and \$45,760 per year (ESI 1997).

Indirect employment resulting from the Proposed Action most likely would be concentrated in the lower-end retail and services sector of the local economy, which already accounts for a large percentage of jobs in the Safford area and which often pays too little to support a family. Higher-paid jobs—for example in construction, teaching, or the medical field—would also be generated but would be in the minority (ESI 1997).

- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

- < **No Action Alternative.** The No Action alternative would not change income characteristics in the Safford area or in Graham County as a whole.

#### 4.3.5.2.3 Taxes

- < **Proposed Action Alternative.** The estimated total state and local taxes that would be generated by the Proposed Action over the life of the Project is estimated at \$150,875,700. This revenue would come from two sources: taxes paid by PDSI and taxes paid by workers as a result of direct and indirect employment (Table 4-23). State and local taxes paid by PDSI are estimated to total about \$137.7 million. In addition, PDSI would pay an estimated \$282.54 million in federal income and payroll taxes over the life of the Project, bringing their total estimated tax contribution to over \$420 million (ESI 1997). Direct and indirect employment resulting from the Proposed Action would contribute an estimated \$13,175,700 in the state and local tax revenue. A breakdown of these tax payments is presented in Table 4-24.

Table 4-23. Estimated Total State and Local Tax Revenues That Would Be Generated by the Proposed Action Over the 16-year Life of Project

Tax Payer	Property (local)	Sales (state & local)	Income (state)	Severance (state)	Construction (state & local)	TOTAL
PDSI	\$52,000,000	\$5,400,000*	\$43,000,000	\$31,000,000	\$6,300,000	<b>\$137,700,000</b>
Employees (Direct & Indirect)	\$2,229,000	\$562,700	\$10,384,000	-	-	<b>\$13,175,700</b>
<b>TOTAL</b>	<b>\$54,229,000</b>	<b>\$5,962,700</b>	<b>\$53,384,000</b>	<b>\$31,000,000</b>	<b>\$6,300,000</b>	<b>\$150,875,700</b>
<b>Average Annual</b>	<b>\$3,389,313</b>	<b>\$372,669</b>	<b>\$3,336,500</b>	<b>\$1,937,500</b>	<b>\$393,750</b>	<b>\$9,429,732</b>

Sources: ESI 1997, Tables II-17 & II-18; J. Korolsky, PDSI, pers. comm.

\* Includes state sales taxes paid for purchases made outside the local area. An estimated \$654,284 would be paid in Graham County (Based on ESI 1997, Table II-18b).

The impact of the Proposed Action on tax revenues available to Graham County and the communities of Safford, Thatcher, and Pima would be major. Graham County collects the property tax, which represents the bulk of increased local tax revenues, and a 0.05 percent sales taxes. The communities of Safford, Thatcher, and Pima each collect a 1.0 percent sales tax. The county and each of these communities also receive a percentage of the sales, severance, and income taxes collected by the state through Arizona's revenue-sharing program. Distributions of state sales and severance taxes to each county in the state are based on both the total amount of collections in a given county and the proportion of the state population represented by that county. Disbursements sales and severance tax revenue to municipalities are based solely on population. Distribution of state income tax to counties and municipalities is based on population.

Table 4-25 provides the percentages of total state sales, severance, and income tax collections that were returned to Graham County and the communities of Safford, Thatcher, and Pima in 1994 (ESI 1997). Based on these percentages and the estimated revenue totals shown in Table 4-23, the

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Proposed Action could contribute an estimated total of \$57.6 million, or an estimated annual average of \$3.6 million, to local coffers over the life of the Project.

- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.
- < **No Action Alternative.** The No Action alternative would not cause any change in tax revenues in the Safford area or in Graham County as a whole.

Table 4-24. Estimated State and Local Taxes That Would Be Paid by Workers under the Proposed Action

Property taxes generated from new home sales	\$139,306 annually for a rounded total of \$2,229,000
Sales tax generated as a result of consumption by construction workers	\$24,700 over the 15-mo build-out
Sales tax generated as a result of consumption by new households	\$33,612 annually for a rounded total of \$538,000
State income taxes construction workers would pay	\$575,750 over the 15-mo build-out*
State income taxes direct employees would pay	\$343,000 annually for a total of \$5,488,000**
State income taxes indirect employees would pay	Between \$252,000 in Year 1 and \$288,000 in Year 16*** for a total approximating \$4,320,000

Source: ESI 1997

\* Assuming each of the 470 construction workers(the average employment) would pay the Arizona 1995 statewide average of \$980 per filer, averaged over 15 months.

\*\* Assuming each of the 350 direct employees would pay the Arizona 1995 statewide average of \$980 per filer.

\*\*\* Depending on the production scenario and ignoring inflationary effects.

Table 4-25. Distribution of State Revenue-Sharing Funds in Graham County (1994 data)

Recipient	Percent of Total State Sales and Severance Tax Collections	Percent of Total State Income Tax Collections
Graham County	0.52%	0.45%
Safford	0.26%	0.26%
Thatcher	0.13%	0.13%
Pima	0.06%	0.06%
<b>TOTAL</b>	<b>0.97%</b>	<b>0.90%</b>

Source: ESI 1997



### 4.3.5.3 Infrastructure

#### 4.3.5.3.1 Housing

< **Proposed Action Alternative.** The impacts of the construction phase of the Proposed Action on housing would focus on short-term rental accommodations and motels. Currently, few rental opportunities are available in the Safford area to meet this demand (ESI 1997). The production phase of the Proposed Action is expected to affect long-term housing, generating 108 new housing units over the life of the Project (Table 4-26).

Table 4-26. New Households as a Result of Direct Employment Housing			
Employment Housing Demand	Estimated Employees (Total)	Percent needing new housing	New Households
Newcomers/PDSI	250	20 %	50
Newcomers/Contract	100	15 %	15
Local/PDSI	200	15 %	30
Local/Contract	85	15 %	13
<b>TOTAL</b>	<b>635</b>	<b>17%</b>	<b>108</b>

Source: ESI 1997

The demand for new housing would likely be concentrated in the Safford area due to that community's proximity to 1) the project site, 2) employment opportunities for other household members, 3) available housing, and 4) goods and services. An estimated 67 percent of the new households generated by the Project would be located in the City of Safford, while the remaining 33 percent would be distributed throughout nearby Thatcher and Pima, and in the more rural areas (ESI 1997). The following assumptions were adopted to determine local housing demand related to employment at the Dos Pobres/San Juan Project:

- C 80 percent of direct PDSI jobs would be filled within the local Graham/Greenlee area, 15 percent of which would require new housing;
- C 20 percent of direct Dos Pobres/San Juan Project jobs would be filled by newcomers, 100 percent of which would require new housing;
- C Of the 85 percent contract jobs filled by locals, 15 percent would demand new housing; and
- C 15 percent of new contract jobs would be filled by newcomers demanding new housing.

< **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

- < **No Action Alternative.** The No Action alternative would not cause any change in the housing situation in the Safford area or in Graham County as a whole.

#### **4.3.5.3.2 Utilities (Water, Electric/Gas, Sewer, Telephone, Garbage)**

- < **Proposed Action Alternative.** Under this alternative, the estimated additional 145 households expected to result from the Dos Pobres/San Juan Project could burden the existing water system for the City of Safford and the communities Safford supplies (the Town of Thatcher and smaller, unincorporated areas in the immediate vicinity). Even though the estimated percent of growth in households in the area is small (less than 4.0 percent), Safford's water system has water rights to only 2,250 gallons per minute (gpm) (3,632 af/yr) from Bonita Creek, and they are currently pumping an average of 2,140 gpm (3,454 af/yr) with a peak demand of about 4,000 gpm (6,456 af/yr). While the City is pursuing additional sources of water, their supply has yet to be augmented (H. West, BLM, pers. comm.).

The estimated increase in households resulting from the Project is not expected to place an appreciable increased demand on sewer facilities, sources of electrical power, solid waste collection and disposal systems, or on public utility personnel and equipment in the Safford area. The city built a new wastewater treatment plant with a maximum capacity of two million gallons/day; operations began in 2002 and currently this plant processes 875,000 gal/day (D. Gordon, Gila Resources, pers. comm.). The capacity of the plant could be increased to four millions gal/day with very little need for expanded infrastructure (ibid.).

The Proposed Action is expected to impact utilities and public services in a positive way by generating substantially increased property, sales, and construction tax revenues for the City of Safford and Graham County by which to pay for infrastructure needs that are expected as a result of the Project (see Section 4.3.5.2.3 and Table 4-23).

- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.
- < **No Action Alternative.** This alternative would result in no changes to utilities serving the Safford area.

#### **4.3.5.3.3 Schools**

- < **Proposed Action Alternative.** Safford area schools can expect increased enrollment as new families move into the Safford area to work at the Dos Pobres/San Juan Project or local businesses related to the Project and its employees. In the first year of production, an estimated 91 new school-age children are expected as a result of the Proposed Action. Over the life of the mine, an annual average of 95 new school-age children is expected (ESI 1997). Of these students, the Safford School District would receive 64; the Thatcher School District would receive 30. Both districts could anticipate an enrollment increase of 2.0 percent in the first one or two years of the Project. The two smaller school districts in the area, the Pima Unified School District and the Solomon School District,

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may receive some of these students as well, but not in large numbers. Safford schools are near capacity, and all Thatcher schools are at capacity or in need of replacement. The estimated 2.0 percent increase in students attributable to the Proposed Action would not contribute appreciably to an existing and growing need for additional school facilities and staff in the Safford School District, but even this small increase spread over 12 grades might be noticeable in Thatcher.

The Proposed Action would also benefit local school districts by generating increased property tax revenues. PDSI would pay approximately 95 percent of the expected \$54 million increase in total property taxes resulting from the Proposed Action.

- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.
- < **No Action Alternative.** This alternative would result in no changes to schools in the Safford area.

### 4.3.5.3.4 Emergency Response

- < **Proposed Action Alternative.** This alternative would not result in appreciable increased demands on the law enforcement and fire-fighting organizations in the Safford area. Nor would it seriously exacerbate the current shortage of physicians and nurses. The Proposed Action would result in additional local tax revenues to help support law enforcement departments and purchase fire-fighting equipment. PDSI has already contributed to the local hospital in anticipation of any increased demands made by the Project on that facility.
- < **Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.
- < **No Action Alternative.** This alternative would result in no changes to emergency response capabilities in the Safford area.

### 4.3.5.4 Transportation

#### 4.3.5.4.1 Proposed Action Alternative

- < **Roads.** Under the Proposed Action alternative, traffic in the Safford area is expected to increase as a result of employees and commercial trucks traveling to and from the mine site, although the anticipated increase would not exceed the capacity of any road in the study area. The roads and intersections would continue to operate at an acceptable level of performance (LOS "C" or better), even with the mine in full operation. The increase in traffic would be noticeable on the lowest-volume roads (i.e., the Safford-Bryce and Airport Roads) (Curtis Lueck & Associates 1997).

During the construction phase of the Project, the expected distribution of daily traffic at major intersections in the Safford area is based on a peak of 980 employees with an average vehicle occupancy rate of 1.3 (or 754 employee round trips). An additional 100 round trips per day would be



added for construction materials and miscellaneous travel, resulting in a maximum total of 854 vehicle round trips per day (Curtis Lueck & Associates 1997). Travel by employees is not expected to restrict any of the bridges. Trucks transporting materials from the east and south to the mine would use the Solomon Bridge to Airport Road, and trucks arriving from the west would use the Thatcher Bridge to Safford-Bryce Road, thus avoiding the narrow Safford Bridge (Eighth Avenue Bridge) and the more heavily traveled areas of Safford.

During the operational phase, average daily traffic is forecasted at 325 employee round trips and approximately 70 truck round trips (Figure 2-7). Employee trips, which are likely to use any of the four bridges crossing the Gila River, are not expected to cause travel to be restricted at any of these bridges. Additional traffic from material transport is expected to average 100 commercial trucks per day, which includes sulfuric acid tank trucks and other trucks carrying processing materials. Tanker trucks would avoid using the Safford Bridge so as not to impede traffic at that point (Curtis Lueck & Associates 1997).

It is not expected that any roads in the study area would need to be widened as a result of the Proposed Action. The increase in heavy truck traffic on the Safford-Bryce Road could degrade the pavement of that road in places where the structural integrity is questionable. The safety of increased truck traffic on Safford-Bryce and Airport Roads could be compromised by the existence of at least five curves with advisory speeds of 25 miles per hour (mph) or less on roads posted for 55 mph. The Proposed Project would result in substantial payments by PDSI in state and local taxes that fund road repair.

- < **Air Traffic.** The Proposed Action alternative would not impact air traffic around the Safford Municipal Airport. The proposed 230 kV powerline that would transmit power to the Project from the existing Hackberry 230 kV powerline southeast of the project site does cross through the protected area around the airport (see Section 3.2.5.4.4, Air Traffic, and Figure 3-16). However, the pole structures supporting the line would not rise above the constraining Horizontal or Conical Surfaces. Figures 4-16 and 4-17 depict the pole structures in relation to the imaginary surfaces at three points located along Cross Sections AA', BB', and CC', respectively (see Figure 3-17 for the positions of these cross sections). According to an initial transmission line design, the pole shown on Cross Section BB' would exceed the height limit by five feet; however, the design has been modified so that no poles along the line would pierce the Conical Surface (SWCA 1997h).

**4.3.5.4.2 Partial Backfill Alternative.** Impacts of this alternative would be identical to those of the Proposed Action.

**4.3.5.4.3 No Action Alternative.** This alternative would cause no change in transportation in the Safford area.

## **4.3.6 Indian Trust Resources**

### **4.3.6.1 Proposed Action Alternative**

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Water rights to the Gila River held by the Gila River Indian Community and the San Carlos Apache Tribe have been identified as Indian trust assets. The predicted impacts on surface flows in the Gila River as described in Sections 4.3.2.5.1 and 4.3.2.6.1 would be mitigated by implementing an Alternate Year Fallowing Program that leaves water in the Gila River that would otherwise be used for crops (see Appendix F for details of this mitigation). Through the Alternate Year Fallowing Program, the current ability of downstream users, including the Gila River Indian Community and the San Carlos Apache Tribe, to divert water will not be affected. In the absence of actual negative physical impacts to Gila River flows, there would be no adverse impacts to the surface water rights of downstream users resulting from the Project.

In addition to these rights to surface flows in the Gila River, the San Carlos Apache Tribe holds an Indian trust asset in all groundwater under the San Carlos Apache Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999, to which the United States was a signatory. This agreement states that such rights “are held by the United State in trust for the Tribe,” and that the scope thereof is “...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation....” The 2002 groundwater model predicts that the cone of depression (as measured by the one-foot contour line) resulting from project pumping would not reach the southern boundary of the San Carlos Apache Reservation (see Figure 4-8, 100 years). The model does predict a very slight increase in the current rate of groundwater flow from the Reservation southward toward the mining area (maximum peak rate increase of 0.2 af/yr, or 0.07 percent of the current predicted flow), and a nearly zero decline in the groundwater table on the Reservation. Once the Project begins pumping, effects on groundwater would be monitored in accordance with the Mitigation and Monitoring Plan for water resources (Appendix F). Data from groundwater wells located between the Project and the San Carlos Apache Reservation boundary and Bonita Creek would be collected and analyzed to determine if the groundwater surface elevation is responding to groundwater pumping in the manner predicted by the model.

The predicted nearly zero impact to groundwater under the Reservation is unmeasurable and not significant. The Tribe’s ability to access and use groundwater, identified as a trust resource under the San Carlos Apache Tribe Water Rights Settlement Agreement, for the purposes of the Reservation remains unaffected by the Project. No mitigation is proposed for this nearly zero impact. Considering the overall effects to water resources in the Gila River basin as a result of the Project, no significant adverse effects on Indian trust assets held by the Gila River Indian Community or the San Carlos Apache Tribe are expected to result from the Project.

### **4.3.6.2 Partial Backfill Alternative**

Potential impacts of the Partial Backfill alternative on Indian trust resources would be identical to those of the Proposed Action alternative.

### **4.3.6.3 No Action Alternative**

The No Action alternative would not impact Indian trust resources.

## 4.4 LAND EXCHANGE ALTERNATIVES IMPACT ANALYSIS

### 4.4.1 Land Use

#### 4.4.1.1 Public Lands Management

##### 4.4.1.1.1 Land Exchange Alternative

- < **Selected Lands.** The direct impacts of the exchange on the selected lands include transfer of ownership of 16,297 acres of public land administered by the BLM to Phelps Dodge. With the exchange of ownership of the land go all the rights, privileges, and obligations appurtenant to those lands. The BLM's Safford Field Office would relinquish federal jurisdiction and management responsibilities for these lands, including oversight of the mining operations and reclamation activities proposed as the Dos Pobres/San Juan Project. Exchange of the selected lands would not affect any special management areas administered by the BLM such as ACECs, wildernesses, wild and scenic rivers, or National Conservation Areas (NCA), including Riparian NCAs.

Other direct impacts of the exchange alternatives on the selected lands include consolidation of federal land and PD's private land holdings in the Safford Mining District, disposal of the Sanchez building, and reduction in the number of corners of land parcels shared by BLM with PD from 116 to 27. This nearly 77 percent reduction in shared boundary corners represents a mutually improved ability of both BLM and PD to manage their respective lands surrounding and within the project area.

The foreseeable mining uses of the selected lands, including long-range potential uses of the Dos Pobres sulfide orebody and the Lone Star area, would occur without management and oversight by BLM, although federal oversight would still be provided by the COE through their CWA Section 404 permit. Based on the conceptual foreseeable uses for these areas as described in Section 2.2.2.1.2, the potential mine development activities that would be involved in developing the Dos Pobres sulfide orebody and the Lone Star deposit would be subject to the requirements of the Clean Air Act, and the CWA as administered by the COE, thereby providing the federal "trigger" for compliance with other federal environmental laws such as the Endangered Species Act, National Historic Preservation Act, and the National Environmental Policy Act. Therefore, the net effect of the exchange on public lands management is the loss of BLM jurisdiction in particular, and not federal oversight in general, for mining and mining-related support activities on private lands.

Under this alternative, the State Mine Inspector's Office would have jurisdiction over mining reclamation on private lands. State reclamation requirements are similar to federal requirements; Table 4-27 provides a comparative summary of the federal versus State of Arizona reclamation requirements. One difference is that State regulations allow use of a corporate guarantee as a financial assurance for reclamation whereas BLM regulations do not. The State regulations require successful demonstration and certification of a corporate financial test in support of a corporate guarantee, however a corporate guarantee generally represents a higher risk financial assurance mechanism than does cash or a surety bond.

This alternative is consistent with Graham County's Land Use and Resource Policy Plan and Implementation Plan (LURPP), which "encourages mining efforts on public and private lands" (Graham County, Comment Letter No. 74).

< **Offered Lands.** The exchange alternative would result in federal acquisition of about 3,867 acres of offered lands consisting of eleven properties in five Arizona counties in exchange for 16,297 acres of public lands in the BLM's Safford Field Office acquired by PD. Net change is a loss of 12,430 acres of public lands in Arizona. The Safford Field Office would have a net loss of 13,874 acres; the BLM's Tucson Field Office would enjoy a net gain of 1,120 acres; and the National Park Service would enjoy a net gain of 324 acres. Acquisition of the offered lands would result in the following effects to public lands management:

- Increase the BLM-administered lands within the Gila Box RNCA by 855 acres. This would reduce the acreage of private inholdings in the Gila Box RNCA nearly 50 percent, from 1,720 to 865 acres and from 15 to 13 private inholdings. This alternative also would put under BLM management an approximately 2.0-mile portion of an 8.1-mile segment of Bonita Creek that has been recommended for Wild and Scenic River designation.
- Increase BLM-administered lands in the Las Cienegas National Conservation Area (NCA) by 400 acres (Schock and Clyne I properties) and in the Sonoita Valley Acquisition Planning District by 720 acres (Feulner and Clyne II properties). Four private inholdings totaling 1,120 acres would be removed from the Sonoita Valley Acquisition Planning District.
- Increase public lands in the Tuzigoot National Monument near Cottonwood, Arizona, by 324 acres.
- Increase BLM-administered lands in the Dos Cabezas Long-Term Management Area (LTMA) by 1,088 acres and remove three private inholdings. Public access to the Dos Cabezas Mountains Wilderness would be improved through BLM control over lands through which the Happy Camp Canyon Road passes.
- Consolidate BLM-administered lands in the Southwest Gila Valley LTMA with the acquisition of the 400-acre Norton property; and
- Consolidate BLM-administered lands adjacent to the Gila Box RNCA with the acquisition of the 80-acre portion of the Curtis property that lies outside the RNCA boundary, but within the LTMA.

The public land consolidation that would be achieved by this alternative is consistent with and meets the objectives of the Safford RMP, as amended; the Final Gila Box Plan (BLM 1998); and the Tuzigoot Statement for Management (NPS 1995).

Table 4-27. Comparison of Federal and Arizona State Mined Land Reclamation Standards

	Federal Reclamation Standards	State Reclamation Standards
<b>Applies to:</b>	Federal lands	Private lands in Arizona
<b>Compliance Officer:</b>	Authorized Officer (AO) at BLM	Arizona State Mine Inspector
<b>Acreage criterion:</b>	Requires reclamation plan for disturbances over five acres	Requires reclamation plan for disturbances over five acres
<b>Acreage exemptions:</b>	Requires reclamation for disturbances under five acres	Does not apply to disturbances under five acres
<b>Grandfather clause date:</b>	Applies to mining operations constructed on or after January 1, 1981	Applies to mining operations constructed on or after January 1, 1995
<b>Post-closure reclamation objective:</b>	Requires reclamation plan to be suitable for conditions consistent with BLM land use plans and RMPs	Requires reclamation plan to meet post-mining land use objectives approved by State Mine Inspector
<b>Applicable start-date for reclamation:</b>	Requires reclamation to occur concurrently with mining activity when economically and technically feasible, or else to begin at the earliest feasible time	Requires reclamation to occur concurrently with mining activity when possible, or else to begin within two years of cessation of mining activity
<b>Bonding/ Insurance:</b>	Requires a financial assurance mechanism, such as a surety bond or cash, to cover reclamation costs	Requires a financial assurance mechanism for reclamation costs
<b>Reclamation standards:</b>	Includes reclamation standards for waste management, site stability, subsurface stabilization, water management, soil management, erosion prevention, revegetation, wildlife habitat, site protection, and post-closure maintenance	Includes reclamation standards for waste management, subsurface stabilization (case by case determination), site stability, soil management, erosion prevention, revegetation, site protection, and site-specific standards. Water management standards are covered under the state APP Program.
<b>Compliance review:</b>	Allows the AO to inspect operations periodically to determine compliance	Allows the State Mine Inspector to inspect operations periodically to determine compliance; requires annual reclamation status report
<b>Public review/ notification:</b>	Provides for public disclosure of the mining plan through the NEPA analysis	Requires public notification prior to approval or major modification of an approved plan

**4.4.1.1.2 No Land Exchange Alternative.** The No Land Exchange alternative would result in no changes to the existing federal ownership status of public lands by the BLM Safford Field Office. BLM Safford Field Office would continue to manage a complex boundary in the project area created by multiple private inholdings, and additional long-term federal oversight would be required for the mining and reclamation that is expected to occur under the MPO (Proposed Action). The offered lands would remain under PD ownership and management and there would be no public lands consolidation or improved public access in the Gila Box

RNCA, the Dos Cabezas LTMA, and Southwest Gila Valley LTMA in the BLM Safford Field Office; in the Las Cienegas NCA and the Sonoita Valley Acquisition Planning District in the BLM Tucson Field Office; or at the National Park Service's Tuzigoot National Monument.

#### 4.4.1.2 Access and Recreation

##### 4.4.1.2.1 Land Exchange Alternative

- < **Selected Lands.** Under this alternative, PD, as landowner of the selected lands, would have the right to restrict public access on roads entering their private property. The BLM would retain an easement for segments of Solomon Pass Road, West Ranch Road, and Salt Trap Tank Road that pass through the selected lands for public and physical access to the Gila Box RNCA and the Gila Mountains.

Physical access on PD Mine Road would continue to be restricted to authorized persons at the proposed new security gate. San Juan Mine Road would be closed to the public at the new PD property line; however, the BLM would retain an easement or right-of-access on this road to allow the owners of the Melody Claims and allottees to access their mine claims and portions of their allotments, respectively. The BLM would also retain an easement for the spur road leading to the patented Horseshoe Claims from Solomon Pass Road, so that the landowner(s) could continue to access theirland under this alternative. No changes to existing physical and public access on the Lone Star Mountain Road are expected.

Recreational opportunities would be reduced in the project vicinity as a result of the land exchange, but these reductions are not expected to significantly affect recreational use of the area. People driving recreationally in the Gila Mountains or heading to Johnny Creek or the Safford-Morenci Trailhead could no longer use San Juan Mine Road. Public and physical access to these destinations, however, would still be available via Solomon Pass, West Ranch, and Johnny Creek Loop roads. Using these roads instead of San Juan Mine Road would 30-40 minutes to the drive in some cases, depending on the travel route (S. Knox, BLM, pers. comm.). Closure of San Juan Mine Road may cause some recreationists to go elsewhere, but given the attractiveness of the destinations most affected (Johnny Creek Loop, Johnny Creek, and the Safford-Morenci Trailhead) and the availability of an alternate route to those destinations (Solomon Pass Road), any decrease in recreational use of the area resulting from the road closure is expected to be small. Use of Bonita Creek and the Gila Box RNCA, which are currently accessed via Solomon Pass Road, is not expected to be affected. Overall, if the land exchange alternative is selected, the number of backcountry drivers per year using backroads in the vicinity of the project area is expected to continue in the range of 2,800 to 3,100. The numbers of horseback riders and mountain bike riders using these roads are expected to remain at approximately 75 and 30, respectively (S. Knox, BLM, pers. comm.). To mitigate for loss of access to the Gila Mountains via San Juan Mine Road, PDSI has proposed to upgrade (widen, grade, improve drainage) portions of the existing Solomon Pass Road to accommodate fair-weather travel of 2-wheel-drive passenger vehicles.

Under the land exchange alternative, the selected lands would become private property and would no longer be available to hunters on AGFD Hunt Unit 28 or to the four current holders of commercial special recreation permits from the BLM. This restriction in land use is not expected to affect the number of hunters using the general area, nor is it expected to affect the number of commercial special recreation permit holders in the BLM Safford Field Office. The estimated 100 individuals each

year who now hunt deer and javelina on federal and state lands in the project area would likely shift their activity to the deer and javelina habitat available on public lands in the Gila Mountains north of the project area and use Solomon Pass Road to get there. Similarly, the estimated 140 individuals who annually hunt quail and dove, mostly along San Juan Mine Road, would likely shift their hunting to the Solomon Pass area and nearby regions in the Gila Mountains. The four outfitters holding commercial special recreation permits from the BLM Safford Field Office could continue to hold those permits, but would have to move any activities now conducted on the selected lands to other public lands in the region. Portions of the route for the annual Safford Johnny Creek Endurance Ride would now cross property that would be acquired by PD through this alternative; the event promoter could negotiate with PD for permission to cross their property, but any routing decision would be governed by PD's safety and security concerns. Participation in the ride is expected to remain in the vicinity of 85-90 riders and 30-40 spectators (S. Knox, BLM, pers. comm.).

The foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would not affect public and physical access or recreational uses of selected lands beyond those impacts described above.

- < **Offered Lands.** Acquisition of the offered properties would improve public access to public lands. In the Gila Box RNCA, acquisition of the Amado and Curtis properties would assure public pedestrian access through about a two-mile reach of Bonita Creek that was formerly private land; acquisition of the Musnicki, Freeland, and Butler-Borg properties improves and further assures public access along the Happy Camp Canyon Road to the north-central part of the Dos Cabezas Mountains Wilderness; acquisition of the Norton property improves public access along Black Rock Wash Road to the San Carlos Apache Reservation; and acquisition of the Schock, Feulner, Clyne I, and Clyne II properties improves general public access in the Las Cienegas NCA and the Sonoita Valley Acquisition Planning District.

All the offered properties offer dispersed recreational opportunities, including such activities as hiking, mountain biking, backcountry driving, and wildlife/bird watching, among others. The Amado, Curtis, Clyne II, and Tavaschi Marsh also offer recreational opportunities associated with perennial water habitats. Developed recreational facilities associated with the Tavaschi Marsh Restoration Project (a wildlife/bird watching platform, trails, and signage) would continue to be available at the Tavaschi Marsh property. As public lands, the following ten offered properties totaling 3,534 acres would be included in existing AGFD Hunt Units and available for hunting use: Amado, Curtis, Musnicki, Schock, Feulner, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II. Hunting is not allowed in the Tuzigoot National Monument (where the Tavaschi Marsh property lies).

**4.4.1.2.2 No Land Exchange Alternative.** This alternative would not, in itself, cause changes to existing public access or recreational uses of the project area. However, as selection of this alternative would result in BLM authorizing mining on portions of the selected lands per the regulations at 43 CFR § 3809, the impacts described under the Proposed Action would also be expected under this alternative.

Under this alternative, the offered lands would remain privately owned and public access to offered lands or to public lands adjacent to these properties, such as to the north-central portion of the Dos Cabezas Mountains Wilderness via Happy Camp Canyon, would not be improved. Furthermore, no developed or dispersed recreational opportunities associated with the offered lands would be available to the public. The

Tavasci Marsh property would continue to be managed by AGFD under their cooperative management agreement with PD.

#### 4.4.1.3 Encumbrances

##### 4.4.1.3.1 Land Exchange Alternative

- < **Selected Lands.** PD's acquisition of the selected lands would not affect the seven existing right-of-way agreements, as the exchange would be subject to the conditions of those prior existing encumbrances. However, the foreseeable uses of the selected lands would require rerouting and/or construction of some portions of the electric power lines, telephone/telegraph lines, and radio station site per the approved mine plan. These new or revised rights-of-way would be negotiated directly by PDSI with the existing grantees.
- < **Offered Lands.** Public acquisition of the offered lands would be subject to existing rights-of-way, easements, and other encumbrances on titles to the properties. The Clyne II property includes an easement to the grazing leaseholder for a livestock water pipeline and associated roadway; the month-to-month residential lease agreement for the Musnicki property would be terminated if the exchange was authorized. No other encumbrances are known for the offered lands.

**4.4.1.3.2 No Land Exchange Alternative.** Although this alternative, in itself, would not change the legal rights-of-way or easement agreements that the BLM has made for the selected lands, the mining activities anticipated under this alternative would require modifications to these encumbrances as described under the Proposed Action alternative to accommodate the mine plan. The agreements made between PD and others on the offered lands would not be impacted under this alternative.

#### 4.4.1.4 Agriculture/Grazing

##### 4.4.1.4.1 Land Exchange Alternative

- < **Selected Lands.** No prime or unique farmlands would be impacted by this alternative or by the foreseeable uses of the selected lands. Six BLM grazing allotments would be affected by the exchange. Those portions of selected lands and 24 registered range improvements within the Bryce, Talley Wash, Rest Haven, Bonita, Lone Star, and Johnny Creek allotments would be transferred to PD ownership, with a reduction in BLM grazing receipts corresponding the reduced stocking capacity associated with the public lands (Table 4-28).
- < **Offered Lands.** No existing farmlands would be acquired under BLM management through the exchange. Grazing on the offered lands would be allowed per the applicable management plans. The Tavasci Marsh property would be closed to grazing. Within the Gila Box, those portions of the Amado and Curtis properties in the riparian areas would not be open to livestock grazing, per the proposed management action selected in the Final Gila Box Management Plan (BLM 1998). The Musnicki, Schock, Feulner, Freeland, Butler-Borg, Norton, Clyne I, and Clyne II properties, and portions of the Amado and Curtis properties outside the riparian areas would be open to grazing.



For site security and safety reasons and to keep cattle away from operations, PDSI plans to fence a portion of the selected lands around the Project as needed (Figure 4-1). PDSI has indicated that it would lease the selected lands and range improvements outside the security fence to the current allottees for continued grazing use as long as the property is not needed for development of the Dos Pobres sulfide and at Lone Star deposits. Because only a portion of the selected lands would be removed from grazing use by the Project, impacts on grazing are not commensurate with the reduction in BLM-administered land in each allotment. Impacts to BLM grazing income, however, are commensurate with the amount of BLM land removed from each allotment, because revenues generated by grazing leases for those lands would now be paid to PD rather than to BLM.

Table 4-28. Impacts to Six BLM Grazing Allotments as a Result of the Land Exchange Alternative

Allotment	BLM Land in Allotment Exchanged to PD (acres)	Corresponding reduction in BLM AUMs	Corresponding Reduction in BLM grazing receipts at \$1.35/AUM (\$/yr)
Bryce	1,723	45	\$61
Talley Wash	4,338	57	\$77
Rest Haven	232	0	\$0
Lone Star	5,720	189	\$255
Johnny Creek	4,229	325	\$439
Bonita Creek	124	16	\$22
<b>TOTAL</b>	<b>16,366</b>	<b>632</b>	<b>\$854</b>

Data source: C. Templin, BLM, Safford Field Office

Impacts to grazing as a result of the foreseeable uses include the impacts described under the Proposed Action alternative in the Mine Plan Alternatives Set, as well as anticipated reductions in the Bryce, Talley Wash, Johnny Creek, Lone Star, and possibly Bonita Creek allotments from future possible mining at the Dos Pobres sulfide and Lone Star projects as summarized in Table 4-29. The data in this table are based on the acreage of each allotment within the three foreseeable use categories and do not consider the security fence that PDSI plans to install around the Project. No adjustment has been made to the acreage for percent disturbance associated with each foreseeable use category.

Table 4-29. Impacts from Foreseeable Uses for the Potential Dos Pobres Sulfide (DPS) and Lone Star (LS) Projects on Six Grazing Allotments in the Safford Field Office

Allotment	Production Operations & Support Use Areas (ac)		Transitional Use Areas (ac)		Intermittent Use Area (ac)	TOTAL (ac)
	DPS	LS	DPS	LS		
Bryce	1,975	0	331	0	4,710	7,016
Talley Wash	1,363	0	227	0	5,580	7,170
Rest Haven	0	0	0	0	232	232
Lone Star	0	3,817	0	325	10,408	14,550

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Johnny Creek	118	2,014	63	198	4,452	6,845
Bonita Creek	0	0	0	0	124	124
<b>TOTAL</b>	<b>3,456</b>	<b>5,831</b>	<b>621</b>	<b>523</b>	<b>25,506</b>	<b>35,937</b>

**4.4.1.4.2 No Land Exchange Alternative.** While this alternative would not, in itself, affect the current use of the project area or the offered lands for grazing. The six allotments in the project area would continue to be grazed at their current stocking rates; PD would likely continue to lease all the offered lands, except Tavasci Marsh, for grazing use. The Amado and Curtis properties, continuing as private inholdings in the Gila Box RNCA, would not be subject to the grazing limitations in the Final Gila Box Plan (BLM 1998); however, vehicle access to these properties for continued grazing use may be reduced as a result of other BLM management actions (ibid.).

### 4.4.1.5 Mineral Rights

#### 4.4.1.5.1 Land Exchange Alternative

- < **Selected Lands.** As a result of this alternative, PD would own the selected lands and the mineral rights to those lands. No impact to third-party mineral rights is expected to result from the exchange, which is subject to the existing mineral claims on the selected lands per the Agreement to Initiate (ATI) a Land Exchange (BLM 1994b).

No impacts to mineral rights are expected as a result of the potential foreseeable mining uses of the Dos Pobres sulfide and Lone Star area as those areas contain no third-party mining claims.

- < **Offered Lands.** Under this alternative, the following properties totaling 2,299 acres would be closed to mineral entry: all but 80 acres of Curtis and all of Amado, Schock, Feulner, Tavasci Marsh, Clyne I, and Clyne II. A total of 1,568 acres composed of the 80-acre portion of Curtis and all of Musnicki, Freeland, Butler-Borg, and Norton properties would be open to mineral entry per the Safford District RMP. It should be noted that the metallic mineral potential of the offered lands is low, except for sand and gravel and/or geothermal on some properties (see Tables 3-27, 3-29, 3-31, 3-33, 3-35, 3-37, 3-39, 3-41, 3-42, 3-44).

**4.4.1.5.2 No Land Exchange Alternative.** This alternative would not affect PD's or third-party mineral rights on the selected lands or on the offered lands. PDSI would retain the ability to develop its existing mineral claims on the selected lands through a BLM-approved mining plan of operations, assuming all other environmental permits were secured. Thus, the selection of this alternative, in light of the submitted MPO as the Proposed Action, would result in BLM-authorization of the proposed mining of the project area if all permitting requirements are met.

### 4.4.1.6 Surface Water Rights

#### 4.4.1.6.1 Land Exchange Alternative

- < **Selected Lands.** Under this alternative, the surface water rights would remain appurtenant to the selected lands and would pass to PD unless reserved, severed, and transferred elsewhere by BLM or other holders. For surface water rights registered to BLM or PD, however, BLM and PD have agreed to mutually swap these rights associated with the selected and offered lands under this alternative. BLM would relinquish to PD 11 surface water rights totaling 9.06 af/yr that it has registered with ADWR for the selected lands (refer to Table 3-6), including water rights whose place of use lies within the footprints of the foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects. Although the exchange as a whole represents a significant net gain in BLM water rights (see below), BLM would sustain a net loss of about 8 af/yr of BLM-owned water rights within the Gila River watershed itself (BLM acquires 1 af/yr on the Amado property and loses 9.06 af/yr on the selected lands). However, no real impact to Gila River flows is expected as a result of the net loss in water rights as the exchange affects only ownership of the right and not its current designated use.

However, the foreseeable mining uses associated with the Dos Pobres/San Juan Project would physically impact 21 surface water rights that lie within the Project boundary fence; these impacts have been accounted for in the calculation of impacts to surface water quantity expected as a result of the Proposed Action alternative. Foreseeable mining uses within Production Operations and Support areas and Transitional Use areas identified for potential mining at Dos Pobres sulfide and Lone Star would impact four surface water rights totaling 5.75 af/yr on the selected lands.

- < **Offered Lands.** Under this alternative, BLM would acquire eight surface water rights appurtenant to the offered parcels totaling 830.17 af/yr, as identified in Table 4-30. This would represent a net gain for BLM of 821.11 af/yr, or roughly 90 times the surface water rights exchanged to PD on the selected lands. The vast majority of the surface water provided to BLM under these water rights (806.5 af/yr or about 97 percent of the total) is appurtenant to Shea Spring, the primary water source for Tavasci Marsh.

**4.4.1.6.2 No Land Exchange Alternative.** This alternative would not affect surface water rights, either physically or legally. All current holders of registered water rights to the project area and to the Gila River or to the offered lands would continue to hold and exercise their surface water rights. However, as mining in the project area would likely be implemented as a result of PD submitting their MPO (Proposed Action) to BLM, impacts to surface water rights identical to those described under the Proposed Action alternative would be expected to occur.

#### **4.4.1.7 Blasting Noise and Vibrations**

##### **4.4.1.7.1 Land Exchange Alternative**

- < **Selected Lands.** While the exchange itself does not propose blasting and therefore would have no impacts from noise and vibrations associated with blasting, the foreseeable uses of the selected lands associated with the Dos Pobres San Juan Project would result in noise and vibrational impacts identical to those described in Section 4.3.1.7.1 for the Proposed Action alternative. Although no specific blasting activities have been proposed for the potential foreseeable mining uses of the Dos Pobres sulfide or the Lone Star area, it is expected that the noise and vibrations associated with future blasting that could be heard or felt at Mt. Graham or in Safford would be similar in magnitude to those of the Proposed Action alternative. These would probably occur during the latter period of the Dos Pobres/San Juan Project, when blasting at the Dos Pobres Mine has stopped. Therefore,

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depending on the timing of these projects, the total number of daily blasts on the selected lands could increase or decrease slightly.

Table 4-30. Surface Water Rights on the Offered Lands That Would Be Acquired by BLM

Offered Property	Registration Number	Place of Use	Holder	Water Source	Specified Use <sup>1</sup>	Quantity <sup>2</sup>
<b>Base Package</b>						
Amado	4A-0004782 0001	T5S R27E Sec 10 SW NE T5S R27E Sec 3 NE SW	PD Corporation	Bonita Creek	S	1.00 af/yr
Musnicki	36-0065222	T14S R28E Sec 9 SE SE <sup>3</sup>	PD Corporation	Ninemile Creek	I, D, S	15.00 af/yr
Feulner	36-0064893	T18S R18W Sec 5 NW SE	PD Corporation	Upper Coyote Spring	S	3.00 af/yr
<b>Optional Package</b>						
Tavasci Marsh	36-0025460	T16N R3E Sec 15 NE SW <sup>4</sup>	PD Corporation	Shea Spring	I, W	806.50 af/yr
Norton	36-0002041	T5S R23E Sec 30 NE NE	PD Corporation	Black Rock Wash	S, W	0.30 af/yr
Clyne I	36-0019771 0001	T19S R18E Sec 10 NE SW	PD Corporation	Bear Spring Canyon	S	2.00 af/yr
Clyne II	33-0030167 0001	T19S R18E Sec 21 SW NE SE	PD Corporation	Mud Spring	W	0.37 af/yr
	36-0029484 0001	T19S R18E Sec 22 NE NW	PD Corporation	Mud Springs Canyon	S	2.00 af/yr
<b>TOTAL</b>						<b>830.17 af/yr</b>

<sup>1</sup> Specified Use: A=Irrigation, C=Commercial, D=Domestic, I=Industrial, M=Municipal, S= Stock, W= Wildlife, X=Mining.

<sup>2</sup> af/yr = acre-feet per year. 1 acre-foot = 325,851 gallons.

<sup>3</sup> The legal description of this surface water right is not specific enough to ensure that this right is actually on the Tavasci Marsh property.

<sup>4</sup> Point of diversion (place of use not available). While surface water rights are attached to place of use, and therefore the point of diversion has no effect on water rights, the place of use and point of diversion are often the same, especially for "36-" water rights (ADWR 1995, 1996).

< **Offered Lands.** No blasting noise and vibrational impacts would affect the offered lands under this alternative.

**4.4.1.7.2 No Land Exchange Alternative.** This alternative does not, in itself, propose any activities that would result in noise or vibrational impacts to either the selected or offered lands. However, as mining is expected to occur under this alternative, noise and vibrational impacts identical to those described for the Proposed Action alternative would be anticipated.

#### 4.4.1.8 Visual Resources

##### 4.4.1.8.1 Land Exchange Alternative

- < **Selected Lands.** Under this alternative, BLM's VRM class objectives would not apply to mining activities on private lands. The exchange itself would not impact visual resources of the selected lands; however, the foreseeable uses of the selected lands would modify the landscape to a considerable extent. The uses associated with the Dos Pobres/San Juan Project would result in impacts identical to those described under the Proposed Action alternative, and potential development of the Dos Pobres sulfide and Lone Star projects would amplify and extend those impacts. Developing the Dos Pobres sulfide orebody would mean continuing traditional open pit mining, continuing to process ore with the SX/EW method, and expanding the mine-for-leach pit at Dos Pobres. Conventional concentrating processes would be used as well. These processes require a primary crusher, a semi-autogenous (SAG) mill (composed of ball mills and flotation trains), and storage of concentrate, and they create tailings. Mining the Lone Star oxide orebody would likely involve the same SX/EW process as the proposed for the Dos Pobres/San Juan Project, including creation of a leach pad and development rock stockpiles.

These foreseeable mining uses would alter the landscape of the Gila Mountains and its southern flank, affecting the silhouette of Lone Star Mountain. Contrasting light colors from the tailings and unnaturally regular horizontal and diagonal lines associated with a tailings impoundment and processing facilities are likely to be visible from many points in the Safford Valley. The massing effect of the three mines across the base of the Gila Mountains would create a zone below the horizon of large-scale, mesa-like or terrace-like forms, with various structures, roads, and contrasting colors visible.

- < **Offered Lands.** The visual resources of the offered lands would become a resource managed by the BLM (or by NPS for Tavasci Marsh) under the land exchange alternative. The visual resources of the Tavasci Marsh, Amado, and all but 80 acres of the Curtis property would be managed to preserve the existing character of the landscape. The visual resources of the 80-acre portion of Curtis, Musnicki, Schock, Feulner, West Freeland, Butler-Borg, Clyne I, and Clyne II properties would be managed to partially retain the existing landscape character; the visual resources of the Norton, North Freeland, and East Freeland properties would be managed to provide for major modification of the existing character of the landscape.

**4.4.1.8.2 No Land Exchange Alternative.** This alternative, in and of itself, would not affect visual resources management in the project area. BLM would continue to manage public lands in the project area per the applicable visual resource management objectives. However, in light of the Proposed Action alternative and BLM's requirements under 43 CFR § 3809, the mining that is expected to occur under this alternative would likely result in visual resource impacts identical to those described under the Proposed Action alternative. Visual resources on the offered lands would be subject to management by PD; VRM classifications of adjacent or nearby public lands would not apply.

#### 4.4.1.9 Hazardous Materials

##### 4.4.1.9.1 Land Exchange Alternative

- < **Selected Lands.** Per the Resource Conservation and Recovery Act of 1976 and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, BLM required a Phase I Environmental Assessment of the selected lands and offered lands. Under this alternative, an unquantified portion of the San Juan zipACIDS site which lies on BLM selected lands would be exchanged to PD (Zenitech 1998a). PD is aware of this disclosure, would accept the liability associated with acquiring this portion of the selected lands, and has already initiated clean-up activities at the San Juan zipACIDS site, including the portion that lies on the selected lands. The foreseeable mining uses of the selected lands would eliminate the San Juan site as the mine is developed. As discussed under Section 4.3.1.9.1, the potential risk for impacts from a release of hazardous materials would be increased due to the transport, use, and storage of such materials on the mine site; however, PDSI's Spill Containment and Pollution Prevention Plan and use of BADCT design standards should minimize that potential. Prior to the land exchange (if it is authorized), information about use of the selected lands will be updated to ensure that no hazardous materials have been introduced since the original assessment.
  
- < **Offered Lands.** There are no known hazardous materials sites on the offered lands, and acquisition of the eleven offered properties would bring no known hazardous materials sites into public ownership (Zenitech 1998b). Prior to the land exchange (if it is authorized), information about land use of the offered properties will be updated to ensure that no hazardous materials have been introduced since the original assessment.

**4.4.1.9.2 No Land Exchange Alternative.** This alternative, in and of itself, would not affect hazardous materials and neither increase nor decrease the BLM's liabilities for hazardous materials sites on public lands. However, given that mining would likely occur on portions of the selected lands, impacts identical to those described under the Proposed Action for hazardous materials are anticipated. This alternative would have no effect on the offered lands.

#### 4.4.2 Physical Resources, Including Waters of the U.S.

##### 4.4.2.1 Climate

##### 4.4.2.1.1 Land Exchange Alternative

- < **Selected Lands.** The land exchange alternative itself would not physically affect climate, either directly or indirectly. Potential impacts to climate, if any, would result solely from foreseeable mining uses of the selected lands, as described in Section 4.3.2.1.1 in the Mine Plan Alternatives Set. Based on the conceptual foreseeable uses described for the potential Lone Star and Dos Pobres sulfide projects, on-site wind patterns on the selected lands would likely change as a result of large-scale changes in topography from construction of mine facilities such as open pits or cuts, leach pads, and development rock stockpiles. These impacts, if they occur, would likely be long term but localized.

- < **Offered Lands.** Neither the exchange itself nor the foreseeable uses of the offered lands is expected to affect local or regional climate.

**4.4.2.1.2 No Land Exchange Alternative.** This alternative would have no impact to existing climate of either the selected or offered lands. The anticipated mining activities that would likely occur on portions of the selected lands would result in impacts to local wind patterns identical to those described under the Proposed Action alternative.

#### **4.4.2.2 Air Quality (Criteria Air Pollutants and Class I Airsheds)**

##### **4.4.2.2.1 Land Exchange Alternative**

- < **Selected Lands.** The land exchange *per se* would not generate any criteria air pollutants or affect Class I airsheds within 100 kilometers of the selected lands. However, the proposed foreseeable uses of the selected lands include mining construction and operational activities that would generate emissions subject to Clean Air Act requirements.

The potential impacts to criteria pollutants and to Class I airsheds for the specific foreseeable uses proposed at the Dos Pobres/San Juan Project are described in Section 4.3.2.2.1. Although only conceptual plans are known at this time for the foreseeable uses at the Dos Pobres sulfide project, the anticipated activities that involve traditional ore concentrating methods (i.e., tailings, concentrator) may result in emissions of criteria pollutants that would classify the project as a major new source, thereby requiring compliance with a Class I air quality permit, regardless of private land status. Compliance would mandate no exceedances of air quality standards; however, an increase in ambient concentrations of criteria pollutants such as PM<sub>10</sub> would likely result. The potential foreseeable uses at the Lone Star project, however, would probably be similar in types of emissions to the Dos Pobres/San Juan Project, which has been classified as a minor source requiring a Class II air quality permit (Class One Technical Services 1997). ADEQ's source determination for these potential projects, if implemented, would be based on the level of point source emissions for all regulated pollutants, as defined by ADEQ. For major sources only, ADEQ requires an air quality impact analysis on Class I airsheds located within 100 kilometers of the process boundary (ibid.).

- < **Offered Lands.** Neither the land exchange nor the foreseeable uses of the offered lands would generate criteria air pollutants subject to Clean Air Act requirements. No impacts on Class I airsheds are expected from the federal acquisition or foreseeable uses of the offered lands.

**4.4.2.2.2 No Land Exchange Alternative.** This alternative, in and of itself, would not change existing conditions for air quality, criteria pollutants, or Class I airsheds on either the selected or offered lands. However, as mining would likely occur, the impacts to air quality, criteria pollutants, and Class I airsheds as described under the Proposed Action would be expected.

##### **4.4.2.3 Geology**

**4.4.2.3.1 Land Exchange Alternative.** The primary geological resource of concern to this analysis is the economic mineral potential of the exchange lands.

- < **Selected Lands.** The mineral potential of the selected lands has been included in the appraised value of the selected lands. While the economic mineral potential would not be directly or indirectly affected by the exchange itself, the foreseeable uses of the selected lands involve mining of the metallic mineral deposits (copper) found therein as well as on-site use of common variety minerals such as sand, gravel, decomposed granite, aggregate, and rock suitable for riprap. Thus, the metallic and common-variety mineral potential of portions of the selected lands would be largely reduced as the foreseeable uses are implemented as described in Section 4.3.2.3.1. The long-range foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would likely include use of common variety minerals that may occur within Intermittent Use areas of the selected lands as part of construction and mine development activities for those projects; the sulfide and oxide orebodies associated with these potential projects are located on existing PD private lands.
  
- < **Offered Lands.** If acquired into public ownership, five of the offered properties, or portions thereof, would be open to mineral entry under this alternative. The properties that would be open to mineral entry are Musnicki, Freeland, Butler-Borg, Norton, and 80 acres of Curtis that lie outside of the Gila Box RNCA boundary. Of these properties, all have low mineral potential for coal, oil, gas, sodium, potassium, uranium, thorium, geothermal resources, metallic minerals, non-metallic and industrial minerals, and common variety minerals, with the following exceptions: Freeland and Butler-Borg were classified as having moderate mineral potential for common variety minerals and Norton was evaluated as having moderate mineral potential for geothermal resources. For the six properties with low economic mineral potential, it is unlikely that mining claims would be filed for their mineral resources; the mineral resources of the Freeland, Butler-Borg, and Norton properties could become encumbered under the General Mining Law of 1872, FLPMA, and other public lands mineral regulations. The Tavasci Marsh, Amado, Schock, Feulner, Clyne I, and Clyne II properties and all but 80 acres of the Curtis property would be closed to mineral entry.

**4.4.2.3.2 No Land Exchange Alternative.** This alternative would not affect existing mineral resources in the selected lands or on the offered lands. The mineral resources on the selected lands would still be controlled by PD through their mining claims, and through submittal of their MPO (the Proposed Action), are expected to be developed as described under the Proposed Action alternative. As private lands, the offered lands mineral resources could be developed without federal oversight to the degree that such activities are allowed without a federal permit.

#### **4.4.2.4 Soils**

##### **4.4.2.4.1 Land Exchange Alternative**

- < **Selected Lands.** The land exchange itself would not affect soils; however, the foreseeable mining uses of the selected lands would. These effects for the Dos Pobres/San Juan Project are described in Section 4.3.2.4.1. For the selected lands identified for Production Operations and Support and Transitional Uses for the potential Dos Pobres sulfide and Lone Star projects, the area's low productivity soils would be similarly disturbed by expansion of the Dos Pobres pit and mining of the Lone Star pit, construction of new or expanded leach pad areas, and construction of new mining support facilities like a tailings impoundment, a concentrator, and new roads and stormwater management facilities. Some stockpiling of soils for reclamation uses would be anticipated and on-site erosion would be controlled in a manner consistent with safety and operational requirements.



- < **Offered Lands.** This alternative is not expected to directly affect the soil resources of the offered lands. BLM erosion control practices may be implemented on an as-needed basis for properties or portions thereof in which soil erosion may be affecting public access, public safety, or other natural resources.

**4.4.2.4.2 No Land Exchange Alternative.** The soils of the selected lands and of the offered lands would not be impacted by this alternative, in and of itself. However, soils impacts as described by the Proposed Action would be expected as a result of BLM's subsequent authorization of a mine plan.

#### **4.4.2.5 Groundwater**

##### **4.4.2.5.1 Groundwater Quantity**

- < **Land Exchange Alternative**

- C **Selected Lands.** The land exchange itself would not impact groundwater quantity. Based on the hydrogeologic model prepared for the Project, the foreseeable uses of the selected lands as described by the Proposed Action would result in impacts to groundwater quantity as discussed in Section 4.3.2.5.1. As BLM oversight for mining would be removed under this alternative, federal oversight to ensure mitigation for these impacts as described in Appendix F would be included in the COE's 404 permit. Anticipated impacts include creation of a cone of depression emanating outward from the production well field and from the Dos Pobres and San Juan pits that reflects a long-term reduction of the volcanic aquifer's groundwater surface elevation. Although PD does not yet know the water source for these possible future projects, it is assumed for the purposes of this analysis that the same aquifer for the Dos Pobres/San Juan Project would also be used to supply process and make-up water for the potential Production Operations and Support uses at the Dos Pobres sulfide and Lone Star projects; the pumpage necessary for these potential projects, however, has not been quantified. Continued pumping of the volcanic aquifer would extend and increase the long-term impacts to groundwater quantity beyond those predicted for the Dos Pobres/ San Juan Project, but at this time, it is not possible to quantify the amount or temporal extent of the additional anticipated impacts. As implementation of these foreseeable uses on private lands in the future would still require compliance with Section 404 permit requirements, the extent of these impacts to the regional groundwater system would be evaluated by the COE under a separate NEPA analysis at that time.

- C **Offered Lands.** The Land Exchange alternative is not anticipated to impact regional groundwater systems of the offered lands.

- < **No Land Exchange Alternative.** Retaining the selected lands in public ownership would not affect the existing regional groundwater system. However, groundwater impacts from mining as described in the Proposed Action are expected with BLM's subsequent authorization of a mine plan alternative. Groundwater quantity on the offered lands would also remain the same as the existing conditions



#### 4.4.2.5.2 Groundwater Quality

##### < Land Exchange Alternative

- C **Selected Lands.** The land exchange is not expected to impact groundwater quality either directly or indirectly. The foreseeable uses, however, involve mining activities and production facilities that are subject to regulation under the State of Arizona's APP Program administered by ADEQ. Based on APP requirements, mining activities under the Dos Pobres/San Juan Project (Proposed Action alternative) are not expected to cause an exceedance of numeric aquifer water quality standards at or beyond the proposed points of compliance that are identified in PDSI's APP application. Use of liner systems for the leach pad, excess process solution impoundment, and stormwater impoundment; stormwater impoundment sized for the 100-year/24-hour storm event and 24-hour power outage; double containment systems for the SX/EW tankhouse facilities; and other environmental protection measures are applications of best available demonstrated control technologies (BADCT) used in the Project to maximize protection of groundwater quality.

The potential future foreseeable uses at the Dos Pobres sulfide and Lone Star projects would also be subject to APP requirements for groundwater protection; therefore, no exceedances of state numeric aquifer water quality standards at or beyond the proposed points of compliance would be expected.

- C **Offered Lands.** The land exchange is not anticipated to affect the regional groundwater quality of the offered lands.

- < **No Land Exchange Alternative.** The No Land Exchange alternative, in and of itself, would not impact existing groundwater quality of either the selected or the offered lands. However, impacts to groundwater quality identical to those described for the Proposed Action are expected as a result of the subsequent authorization of a mine plan alternative.

#### 4.4.2.6 Surface Water

##### 4.4.2.6.1 Surface Water Quantity

##### < Land Exchange Alternative

- C **Selected Lands.** The land exchange would not impact surface water quantity of the selected lands either directly or indirectly. The foreseeable mining uses of the selected lands are predicted to result in the surface water quantity impacts discussed under the Proposed Action alternative in Section 4.3.2.6.1 in the Mine Plan Alternatives Set. These long-term impacts include a maximum predicted impact to Gila River flows of about 149 af/yr at Year 450 as a result of the effects of groundwater pumping, the pit lake effect, and the permanent retention of surface waters (for stormwater management) that are tributary to the Gila River (URS 2002a). Predicted impacts would be mitigated as described in Section 4.3.2.6.1.

For the foreseeable uses at Dos Pobres sulfide and Lone Star, it is anticipated that surface water flows in Production Operations and Support Areas would be retained on-site as part of a stormwater management program yet to be developed. Surface flows in the Gila River may also be captured as a result of the effects of continued groundwater pumping for the two potential projects. No quantification has been made of these potential, long-term impacts to surface flows to the Gila River and its tributaries.

For the foreseeable uses at the Dos Pobres/San Juan Project, the groundwater model predicts impacts to flows in Bonita Creek to be nearly zero (URS 2002a). However, as these future potential projects would be subject to federal permitting under Section 404 of the CWA by COE, such impacts would be quantified and evaluated under a separate NEPA analysis prepared if and when those projects are proposed.

- C     **Offered Lands.** The surface flows of drainages on the offered lands would not be impacted by the land exchange.
  
- <     **No Land Exchange Alternative.** This alternative, in and of itself, would not affect existing surface water quantity on either the selected or the offered lands. However, surface water quantity impacts resulting from the subsequent authorization of a mine plan would be expected and would be identical to those described for the Proposed Action alternative.

#### 4.4.2.6.2 Surface Water Quality

- <     **Land Exchange Alternative**

- C     **Selected Lands.** The land exchange itself would not impact surface water quality of the selected lands. Implementation of the foreseeable uses for the Dos Pobres/San Juan Project includes measures in compliance with Sections, 401, 402, and 404 of the CWA to protect surface water quality. Stormwater that comes into contact with mine facilities is not expected to leave the mine site and facilities have been designed to entrain stormwater that falls on-site within the mines' process and make-up water systems. Foreseeable Production Operations and Support Uses at the potential Dos Pobres sulfide and Lone Star projects would also be subject to Sections 401 (State Water Quality Certification), 402 (AZPDES), and 404 (Dredge and Fill) permit requirements that would assist in protecting quality of surface waters off the mine site.

The sediment transport characteristics of drainages in the Dos Pobres/San Juan Project altered for stormwater management would change as described in Section 4.3.2.6.2. For the Dos Pobres sulfide and Lone Star projects, foreseeable uses in Production Operations and Support Areas and in Transitional Areas, it is anticipated that additional drainages within the selected lands would be altered as part of stormwater management activities for those future potential projects. Therefore, sediment transport characteristics would also be expected in diverted and recipient drainages, although the extent of those impacts cannot be quantified at this time.

- C     **Offered Lands.** No impacts to the surface water quality of the offered lands are anticipated as result of the land exchange. Public management of the Tavasci Marsh property and the Curtis and Amado properties on Bonita Creek would continue to maintain the existing water quality of the aquatic habitats on those lands.
- <     **No Land Exchange Alternative.** This alternative, in itself, would not affect existing surface water quality of either the project area or of the offered lands. However, the subsequent mining that would occur resulting from BLM's selection of a mine plan alternative would result in impacts identical to those described for the Proposed Action alternative.

#### **4.4.2.6.3 Pit Lakes**

##### **<     Land Exchange Alternative**

- C     **Selected Lands.** The land exchange itself would not directly or indirectly result in creation of pit lakes. The foreseeable mining at the Dos Pobres/San Juan Project would result in formation of permanent pit lakes at the Dos Pobres and San Juan pits as described in Section 4.3.2.6.3. Implementation of the foreseeable uses at the possible Lone Star project would also create a pit lake whose water chemistry and ultimate size/depth cannot be determined at this time. If the foreseeable uses at the Dos Pobres sulfide project are implemented, the Dos Pobres pit would be expanded to mine the sulfide ores. The Dos Pobres pit lake under this alternative would be expected to form sometime after completion of the potential Dos Pobres sulfide project. No projections have been made as to the water chemistry and ultimate size/depth of pit lake formed after the Dos Pobres sulfide project; however, because the foreseeable uses at the Dos Pobres sulfide and Lone Star projects would be subject to CWA Sections 401, 402, and 404 permitting in the future, the potential pit lake impacts would be characterized, quantified, and evaluated at that time.
- C     **Offered Lands.** None of the foreseeable uses of the offered lands would result in creation of a pit lake.
- <     **No Land Exchange Alternative.** Under this alternative, the existing water quality of the San Juan pit lake would not change and no pit lake would be expected at Dos Pobres since no further development of that orebody would occur. However, in selecting this alternative, BLM would have to make a subsequent decision regarding one of the mine plan alternatives, therefore, the pit lake impacts described under the Proposed Action alternative would be expected to occur.

#### **4.4.2.6.4 100-year Floodplains**

##### **<     Land Exchange Alternative**

- C     **Selected Lands.** Under this alternative, PD would manage some lands within the FEMA-designated 100-yr floodplain of the Gila River. No other direct or indirect impacts to 100-yr floodplains in the vicinity of the project area are expected. The anticipated changes in the hydrologic regimes of several washes on the portions of the selected lands affected by the

foreseeable uses at the Dos Pobres/San Juan Project are also not expected to impact 100-yr floodplains (see Section 4.3.2.6.4). Implementation of foreseeable uses at the potential Dos Pobres sulfide and Lone Star projects would also be expected to change the hydrologic regimes of washes directly or indirectly affected by stormwater management operations. At this time, however, no specific facilities have been designed and it is not possible to evaluate the extent of these impacts, if any, on 100-yr floodplains in the project vicinity. Given the distance of these potential impacts from the Gila River and the Graham County landfill, it is likely that washes with increased flows would recover from the increased effects of scour some distance upstream of the 100-yr floodplain boundaries of the Gila River. Therefore, no changes to 100-yr floodplains delineated by FEMA are expected.

- C **Offered Lands.** The 100-yr floodplains on the offered lands would come under BLM management and protection. The land exchange would have no other direct or indirect impacts on 100-yr floodplains of drainages near the offered lands.
- < **No Land Exchange Alternative.** This alternative, in itself, would not change the hydrologic regimes of washes or the 100-year floodplain of the Gila River, nor would the Graham County landfill near the confluence of Cottonwood and Peterson Washes be affected under this alternative. However, as selection of this alternative requires BLM to select a mine plan alternative, impacts to 100-yr floodplains identical to those described under the Proposed Action would be expected to occur.

#### 4.4.2.6.5 Waters of the U.S.

- < **Land Exchange Alternative**
  - C **Selected Lands.** The land exchange would not directly or indirectly affect waters of the U.S., as the COE's jurisdiction of WUS extends to both private and public lands. However, the foreseeable uses of portions of the selected lands for the Dos Pobres/San Juan Project would result in the impacts described in Section 4.3.2.6.5. The foreseeable Production Operations and Support Uses, Transitional Uses, and Intermittent Uses of the remainder of the selected lands for the Dos Pobres sulfide and Lone Star projects would also impact waters of the U.S., although no formal delineation has been completed for these areas so no estimate of potential acres of impact can be calculated. As these two potential projects on the selected lands would still be subject to federal permitting under the CWA if PD acquires the land, the impacts to waters of the U.S. would be determined at the time PDSI applies for CWA Section 404 permit from the COE.
  - C **Offered Lands.** No potential waters of the U.S. on the offered lands would be affected by the land exchange. Any potential BLM activities that would impact waters of the U.S. would be subject to CWA Section 404 compliance with the COE.
- < **No Land Exchange Alternative.** This alternative in itself would not result in impacts to waters of the U.S.; however, impacts from mining that are expected occur under this alternative would be identical to those described for the Proposed Action alternative.

### 4.4.3 Biological Resources

#### 4.4.3.1 Vegetation

##### 4.4.3.1.1 Land Exchange Alternative

- < **Selected Lands.** The proposed land exchange, *per se*, would not physically impact vegetation on the selected lands. However, foreseeable uses of the traded selected lands are expected to physically impact vegetation. Direct effects of the Dos Pobres/San Juan Project on vegetation communities are described in detail under the impact assessment for the Proposed Action alternative. Activity related to the more distant Dos Pobres sulfide and Lone Star projects is expected to impact four vegetation community types (Sonoran Desertscrub, Semidesert Grassland, Sonoran Desertscrub-Semidesert Grassland Ecotone, and Disturbed Land—see Table 4-31), which would now be subject to private management under PD ownership. The total acreage impacted in each habitat community in Table 4-31 reflects the varying 5 to 100 percent disturbance assumptions for each foreseeable use category as identified at the beginning of this chapter. These acreages are rough approximations based on generalized footprints of the Dos Pobres sulfide and Lone Star projects depicted in Figure 2-23.

Table 4-31. Acres of Vegetation Communities Impacted on the Selected Lands by Foreseeable Use Category

Vegetation Community Type	Dos Pobres Sulfide (DPS) / Lone Star (LS) Projects				
	Dos Pobres/San Juan Project (Proposed Action) Area Impacted (100%)	Production Operations and Support Areas Impacted (100%)	Transitional Use Areas Impacted (25%)	Intermittent Use Areas Impacted (5%)	TOTAL IMPACTED AREA (acres)
Sonoran Desertscrub	527	221	19	731	1,498
Semidesert Grassland	0	506	29	150	685
Sonoran Desertscrub-Semidesert Grassland	1,220	997	41	409	2,667
Disturbed	184	0	1	24	209
<b>TOTAL</b>	<b>1,931</b>	<b>1,724</b>	<b>90</b>	<b>1,314</b>	<b>5,059</b>

- < **Offered Lands.** Federal acquisition of the 11 offered properties would bring a wide range of desirable vegetation resources into public ownership and under the management of the BLM and the NPS. These resources include perennial water and associated riparian/wetland habitats on the Amado, Curtis, Clyne II, and Tavasci Marsh properties, as described in Chapter 3; xeroriparian habitat on all the properties; and upland habitats consisting of Sonoran Desertscrub, Semidesert Grassland, Oak

Woodland, and Crucifixion Thorn-Juniper-Creosotebush Association. Together, these vegetation communities provide habitats for diverse wildlife, contribute visual character and variety to the landscape, and offer dispersed recreational opportunities to the public.

**4.4.3.1.2 No Land Exchange Alternative.** Under this alternative, BLM would not dispose of the vegetation habitats on the selected lands nor acquire and manage the riparian/wetland, xeroriparian, and upland habitats of the 11 offered properties. In the short term, this alternative would result in no impacts to vegetation resources on either selected or offered lands. Over the long term, however, because PDSI has submitted an MPO to the BLM, it is reasonable to assume that mining activities would proceed on portions of the selected lands, and impacts of that mining are likely to be the same as those described under the Proposed Action alternative.

#### 4.4.3.2 Wildlife Resources

##### 4.4.3.2.1 Land Exchange Alternative

< **Selected Lands.** All wildlife within the state, regardless of land ownership, is under the jurisdiction of the State of Arizona and managed by the Arizona Game and Fish Department (AGFD) per ARS 17-102. PD ownership of the selected lands would not change this jurisdiction, although private ownership would allow PD to prohibit hunting on the selected lands in AGFD Hunt Unit 28.

In the near future, the impacts to wildlife on the selected lands as result of foreseeable uses would be the same as impacts described under the Proposed Action alternative. In the more distant future, projected potential impacts resulting from the Dos Pobres sulfide and Lone Star projects include loss of habitats and a corresponding impact to two game species as shown in Table 4-32. Figures given for the species are based on AGFD density estimates.

Table 4-32. Estimated Number of Mule Deer and Javelina Impacted by Foreseeable Uses of the Selected Lands

Foreseeable Uses	Total BLM Lands Potentially Impacted		Corresponding Range of Potential Impacts to Mule Deer and Javelina Densities (based on AGFD density estimates)	
	acres	sq mi	Mule Deer (4 to 7/sq mi)	Javelina (1.5 to 3/sq mi)
Dos Pobres/San Juan Project (Proposed Action) (100%)	1,931	3.02	12 to 21	5 to 9
Dos Pobres Sulfide/Lone Star Projects				
Production Operations & Support Use Areas (100%)	1,724	2.69	11 to 19	4 to 8
Transitional Use Areas (25%)	90	.14	< 1 to 1	<1
Intermittent Use Areas (5%)	1,314	2.05	8 to 14	3 to 6
<b>TOTAL</b>	<b>5,059</b>	<b>7.91</b>	<b>32 to 55</b>	<b>12 to 24</b>



- < **Offered Lands.** Because the diversity of habitats on the offered lands, including some valuable riparian areas, is greater than on the selected lands, diversity of wildlife species on property coming into public ownership would be greater than diversity on property leaving public ownership. Habitats on offered lands include types that may support BLM priority species such as bighorn sheep (in Bonita Creek), black bear, mule deer, quail, dove, javelina, and mountain lion. Though these lands would become federal and be managed by the BLM or the NPS, wildlife itself would remain the property of the state and be under the jurisdiction of the AGFD.

**4.4.3.2.2 No Land Exchange Alternative.** This alternative would have no immediate effects on wildlife, which would remain under the jurisdiction of the AGFD on both the selected and offered lands. Over the long term, it is reasonable to assume that mining under a BLM-authorized MPO would proceed on portions of the selected lands. Impacts of that mining are likely to be the same as those described under the Proposed Action alternative.

#### **4.4.3.3 Special Interest Species**

##### **4.4.3.3.1 Threatened and Endangered Plants**

- < **Land Exchange Alternative.** The only effect of the proposed land trade on federally listed, proposed, or candidate plant species would be a change in required consultation procedures for proposed actions. Section 9 of the ESA prohibits a person from removing, taking possession of, or maliciously destroying or damaging an endangered plant on areas under federal jurisdiction. These proscriptions do not apply to endangered plants on private or state property that is not subject to federal jurisdiction. Protection of listed plant species on such property is limited to the extent afforded by the pertinent state law—in this case, the Arizona Native Plant Law.

- C **Selected Lands.** Under the Land Exchange alternative, the selected lands would become private lands, and activities affecting federally listed, proposed, or candidate plant species occurring on the property would no longer be subject to BLM review or Section 7 consultation by BLM. Under the ESA, in the absence of federal jurisdiction, protection of such species on private lands would be limited to that afforded by the Arizona Native Plant Law, which requires property owners to notify the Arizona Commission of Agriculture and Horticulture of planned clearing activities (except for activities that occur in the normal course of mining, which are exempt from the notification requirement under ARS Ch.7, Article 1, Sec.3-904 [G] 1993). Since it is highly likely, however, that any foreseeable mining uses on the selected lands undertaken by PDSI that would potentially impact an endangered plant would require one or more federal permits (such as a Section 404 permit from the COE), such activities would be subject to Section 7 consultation with USFWS, regardless of private land status.

At this time, no federally listed, proposed, or candidate plant species are known to occur on the selected lands. The BLM undertook a Section 7 consultation with the USFWS for the Arizona hedgehog cactus after a morphologically similar cactus was found in the project area. Consultation was concluded on June 11, 2002, with the issuance of a biological opinion that the Project would not affect the Arizona hedgehog cactus because the hedgehog cacti within the action area are not the listed entity (USFWS 2002).

- C     **Offered Lands.** No federally listed, proposed, or candidate plant species are known to occur on the offered lands.
  
- <     **No Land Exchange Alternative.** In the short term, this alternative would result in no impacts to federally listed, proposed, or candidate plant species on either the selected lands or the offered lands. Over the longer term, it is reasonable to assume that mining activities would proceed on portions of the selected lands. Impacts of that mining are likely to be identical to those described under the Proposed Action alternative. The offered lands would remain under private ownership. Protection afforded any federally listed, proposed, or candidate plant species found on the offered properties would be limited to that provided by the Arizona Native Plant Law, unless a federal jurisdiction (via a permit or other federal action) is involved.

#### 4.4.3.3.2 Threatened and Endangered Animals

- <     **Land Exchange Alternative.** As with listed plant species, the proposed land trade would affect any federally listed, proposed, or candidate animal species on the selected or offered lands by changing required consultation procedures for proposed actions. However, the change in those procedures would be different for listed animals than for listed plants. Unlike the protection for listed plant species, protection for animal species under Section 9 of the ESA is the same whether the subject land is federal or non-federal. Section 7 of the ESA applies not only to all actions on federal lands but also to federal actions on non-federal lands (such as issuance of a federal permit). The federal agency issuing the permit would have to consult with the USFWS to identify, if possible, ways for the proposed action or an alternative action to proceed without violating Section 9 and jeopardizing the continued existence of the subject species.
  
- C     **Selected Lands.** Under this alternative, the selected lands would become the property of PD, and actions potentially affecting federally listed animal species would no longer be subject to BLM review or Section 7 consultation by the BLM. However, any proposed activity requiring a federal permit or other federal action potentially affecting listed animals would be subject to Section 7 consultation by the agency permitting the activity. PDSI has indicated that its foreseeable uses of the selected lands would be mining, and mining would require one or more federal permits, such as a Section 404 permit. These permits, in turn, would require the lead federal agency (i.e., COE) to comply with all applicable provisions of the ESA prior to issuing the permit. Thus, the most likely management effect of the federal lands becoming private would be that one or more federal agencies would still be responsible for protecting listed animal species under Section 7 of the ESA.

The likely physical effects of the foreseeable uses associated with the Dos Pobres/San Juan Project would be the same as those resulting from the Proposed Action alternative. Section 7 consultation with the USFWS was concluded on June 11, 2002, with the issuance of a biological opinion in which the USFWS concurred that the Project may affect but is not likely to adversely affect the Gila topminnow, razorback sucker, spinedace, and loach minnow, and designated habitat for the razorback sucker, spinedace, and loach minnow. The USFWS also rendered the opinion that the Project, as proposed, is not likely to jeopardize the continued existence of the southwestern willow flycatcher.

Development of the Dos Pobres sulfide and Lone Star deposits could indirectly affect listed, proposed, or candidate animal species with suitable habitat along the Gila River and/or Bonita Creek if stormwater diversions and/or groundwater pumping were to impact flow in either stream. These species are the bald eagle, southwestern willow flycatcher, razorback sucker, spinedace, loach minnow, cactus ferruginous pygmy owl, Gila chub (proposed endangered), and yellow-billed cuckoo (candidate). If the endangered Gila topminnow has not been extirpated from the artesian well in Watson Wash, development of the Dos Pobres sulfide and Lone Star deposits could also indirectly impact that species under the same circumstances. The likelihood and magnitude of potential impacts could only be determined after PDSI developed mine plans for these operations. All potential impacts would have to be mitigated before PDSI could obtain the federal permits required for the project.

- C **Offered Lands.** Three federally listed species (southwestern willow flycatcher, Yuma clapper rail, and razorback sucker) are known to occur, and an additional ten listed species may occur, within one or more of the offered lands. A proposed endangered species, Gila chub, is known to inhabit Bonita Creek, which flows through the Amado and Curtis properties, and a candidate species, yellow-billed cuckoo, is known from both Bonita Creek and Tavaschi Marsh. These species, and any other federally listed, proposed, or candidate animal species potentially occurring on the offered lands would be affected by the Land Exchange alternative by coming under BLM management (except species on the Tavaschi Marsh property, which would come under NPS management). Any action potentially impacting listed animal species would be subject to Section 7 consultation between the managing agency and the USFWS. (Critical habitat is discussed in Section 4.4.3.3.3, below.)

- < **No Land Exchange Alternative.** This alternative would result in no immediate direct or indirect impacts to federally listed, proposed, or candidate animal species. Such species on the selected lands would remain under BLM management. Over the longer term, it is reasonable to assume that mining activities would proceed on portions of the selected lands. Impacts of that mining on listed species are likely to be the same as those described under the Proposed Action alternative. Offered lands would remain under private ownership, and any listed animal species on those properties would be protected by provisions of the ESA that pertain to non-federal lands.

#### **4.4.3.3.3 Critical Habitat.**

- < **Land Exchange Alternative**

- C **Selected Lands.** No designated critical habitat would be affected by the proposed land exchange itself. Potential effects of the more immediate foreseeable uses, the Dos Pobres/San Juan Project, are identical to those described under the Proposed Action alternative. Potential effects of the more distant foreseeable uses (development of the Dos Pobres sulfide and Lone Star deposits) cannot be quantified at this time; however, groundwater pumping and stormwater diversion would occur and any potential impacts of those activities on designated critical habitat for the razorback sucker in the Gila River, critical habitat for the spinedace and loach minnow in Bonita Creek, and proposed critical for the Gila chub in Bonita Creek would have to be mitigated before the federal permits required for the project could be issued.

- C Offered Lands.** This alternative would result in federal protection of additional areas of designated critical habitat for four federally listed species and proposed critical habitat for one proposed endangered species. The Amado and Curtis parcels include designated critical habitat for the spikedace and loach minnow, and proposed critical habitat for the Gila chub. Tavaschi Marsh includes designated critical habitat for the spikedace, loach minnow, razorback sucker, and southwestern willow flycatcher.
- < No Land Exchange Alternative.** No designated critical habitat would be acquired or impacted by this alternative. Impacts of future BLM-authorized mining on the selected lands would likely be the same as those described under the Proposed Action alternative. No impacts are expected to designated critical habitat for the razorback sucker and the southwestern willow flycatcher in and along the Verde River adjacent to the offered Tavaschi Marsh property.

#### 4.4.3.3.4 BLM Sensitive Species

- < Land Exchange Alternative.** One BLM sensitive plant species (Pima Indian mallow) and seven sensitive animal species (California leaf-nosed bat, cave myotis, desert sucker, longfin dace, Sonora sucker, speckled dace, and loggerhead shrike) are known to occur regularly in the project area; fourteen other BLM sensitive species (Arizona giant sedge, big-tailed bat, canyon spotted whiptail, Chiricahua water scavenger beetle, Maricopa tiger beetle, Mexican long-tongued bat, northern gray hawk, pocketed free-tailed bat, three-nerved scurfpea, western burrowing owl, small-footed myotis, long-legged myotis, fringed myotis, and Allen's big-eared bat) may occur.
- C Selected Lands.** If this alternative is implemented, BLM sensitive species on the selected lands would inhabit private property and no longer be subject to the effects of BLM land management actions. Wildlife would remain under the jurisdiction of the AGFD. The known population of Pima Indian-mallow is not expected to be impacted by foreseeable uses of the selected lands because it lies outside the footprints for these projects. Though Pima Indian-mallow plants may be present in other parts of the project area, most of the habitat potentially impacted by mining activities does not appear suitable for this species.

Foreseeable uses of the selected lands are not expected to adversely impact any special status bat species. Nine known mine features lie within the foreseeable use footprints of the Dos Pobres sulfide and Lone Star projects. Of the four features potentially impacted by the Dos Pobres sulfide project, three are considered unsuitable for bats (Features 15, 16, and 22), and one contained only a single bat, which was observed once in four visits over three years (a Townsend's big-eared bat) (SWCA 1997a). Of the five features potentially impacted by the Lone Star project, two features (7 and 8) are considered unsuitable for bats. Three features (9, 10, and 11) are each considered potentially suitable, but no bats or bat signs were recorded at any of them during three visits over five years (ibid.).

All foreseeable uses of the selected lands are expected to affect the Gila monster in the same manner as described under the Proposed Action alternative.

- C     **Offered Lands.** The BLM sensitive species on the offered properties would be affected by implementation of this alternative only to the extent that they would be impacted by BLM land management actions. Wildlife would remain under the jurisdiction of the AGFD.
- <     **No Land Exchange Alternative.** Initially, BLM sensitive species on the selected lands would not be affected under this alternative. Over the long term, however, mining is likely to proceed on portions of the selected lands, and the resulting impacts are expected to be the same as those described under the Proposed Action alternative. BLM sensitive species on the offered lands would not be affected under this alternative.

#### 4.4.3.4 Biodiversity

##### 4.4.3.4.1 Land Exchange Alternative

- <     **Selected Lands.** Change in land ownership status of the selected lands would not affect biodiversity. The foreseeable uses would impact biodiversity on only a localized scale, affecting only the property modified by foreseeable uses or possibly adjacent property, depending on the land use. It is not anticipated that biodiversity of the region would be adversely affected by any of the foreseeable uses of the selected lands.
- <     **Offered Lands.** Federal acquisition and management of the offered lands would neither change nor increase the biodiversity of these properties nor of the regions containing the properties. Consolidation of public land through the exchange is expected to improve the agency's ability to manage the federal lands in the region, which could result in maintaining the current biodiversity of the areas under the current applicable resource management plans.

**4.4.3.4.2 No Land Exchange Alternative.** In the short term, this alternative would maintain the *status quo* of the subject properties and would have no direct or indirect impacts on biodiversity of either the project area or of the offered lands or the regions that include them. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands; therefore, impacts are expected to be the same as those described under the Proposed Action alternative.

#### 4.4.4 Cultural Resources

##### 4.4.4.1 Historic and Prehistoric Archaeological Resources

##### 4.4.4.1.1 Land Exchange Alternative

- <     **Selected Lands.** Disposal of the selected lands (currently the BLM-administered lands in the project area) would remove direct federal protection for all 61 archaeological sites located completely or partially on the selected lands. The selected lands would become the private property of PDSI. As such, they would no longer be subject to provisions of the National Historic Preservation Act, as amended (NHPA) and other federal statutes protecting archaeological resources, unless an action on that property were to require federal authorization of some kind (e.g., issuance of a permit under

the CWA by the COE). Also, the Native American Graves Protection and Repatriation Act (NAGPRA) would no longer protect Indian burial sites on the selected lands because it does not apply to private property under any circumstances. Human remains and burial goods that might incidentally be associated with archaeological sites would be subject to Arizona Revised Statute 41-865, which requires private landowners to follow specific notification and treatment procedures when human remains have been encountered on their property.

All 61 archaeological sites in the project area affected by the change in legal jurisdiction resulting from this alternative are listed in Table D-1 in Appendix D. Of these sites, 29 are prehistoric, 18 are historic, 7 are multicomponent, and 7 are of unknown temporal association. Fifty-seven of the 61 have been recommended as eligible for inclusion in the National Register for their scientific values, and four are considered to be ineligible. Before the 61 sites could be removed from public ownership and protection by the proposed land exchange, the scientific information contained in the 57 eligible sites would have to be retrieved through a test and data recovery program approved by the BLM. This program would be considered mitigation for all potential impacts on archaeological sites, including potential subsurface deposits and human burials, of foreseeable mining uses of the selected lands.

The Land Exchange alternative, *per se*, would have no physical impact on the archaeological resources on selected lands. However, the foreseeable mining uses of the selected lands would result in physical impacts to a total of 22 archaeological sites (see Table 4-33). The Dos Pobres/San Juan Project would affect 13 sites, of which 12 are considered eligible for the National Register for their scientific values. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect nine sites: six within Production Operations and Support areas and three within the Transitional areas. No sites are expected to be impacted in Intermittent Use areas because sites could be avoided by the types of activities anticipated for this category. Of the nine sites in these foreseeable use areas recommended eligible for the National Register for their scientific values, three are prehistoric, four are historic, one is multicomponent, and one is of unknown temporal association. It should be noted that under this alternative, mitigation (testing and data recovery) for impacts to archaeological resources resulting from the land exchange, i.e., loss of federal protection, would occur prior to any physical disturbance by foreseeable mining uses of the selected lands.

- < **Offered Lands.** Under the Land Exchange alternative, the three recorded archaeological sites and several other suspected archaeological site on the offered lands would come under the management of the BLM and be protected by federal legislation such as NHPA and NAGPRA.

**4.4.4.1.2 No Land Exchange Alternative.** In the short term, this alternative would have no effect on historic and prehistoric archaeological resources on either the selected lands or the offered lands. No property would be exchanged; therefore, archaeological sites on public lands in the project area would continue to be managed by the BLM and be subject to NHPA, NAGPRA, and other relevant federal legislation. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands. In that case, impacts to archaeological sites are expected to be the same as those described under the Proposed Action alternative.

Under the No Land Exchange alternative, archaeological resources on the offered properties would remain in private ownership with no direct protection from federal statutes. Human remains and burial goods that

might incidentally be associated with archaeological sites would continue to be subject to Arizona Revised Statute 41-865, which requires (with certain exemptions) private landowners to follow specific notification and treatment procedures when human remains of any kind have been encountered on their property.

Table 4-33. Archaeological Sites on Selected Lands That Would be Directly Impacted by Foreseeable Uses

	Dos Pobres/San Juan Project*		Dos Pobres Sulfide and Lone Star Projects*	
Sites Recommended as Eligible for the National Register for their Scientific Values	AZ CC:2:148	AZ CC:2:193	AZ CC:2:146	AZ CC:2:189
	AZ CC:2:149	AZ CC:2:197	AZ CC:2:147	AZ CC:2:190
	AZ CC:2:151	AZ CC:2:204	AZ CC:2:183	AZ CC:2:194
	AZ CC:2:152	AZ CC:2:213	AZ CC:2:184	AZ CC:2:226
	AZ CC:2:191	AZ CC:2:215	AZ CC:2:188	
	AZ CC:2:192	AZ CC:2:225		
Sites Recommended as Ineligible for the National Register	AZ CC:2:206			

Note that AZ CC:2:200, 211, and 234 are excluded here because they have been named as sacred sites and efforts to avoid them are recommended.

#### 4.4.4.2 Traditional Cultural Properties Identified by Indian Tribes

##### 4.4.4.2.1 Land Exchange Alternative

- < **Selected Lands.** The land exchange would affect all 43 sites on the selected lands identified by tribes as being traditional cultural properties (Table 4-34). Transferring ownership of the selected lands to PD would remove these sites from the direct federal oversight responsibilities required under NHPA. The transfer of ownership would also eliminate the federal consideration extended by the American Indian Religious Freedom Act (AIRFA) to three of the sites, AZ CC:2:200, 211, and 234, that have been identified by tribes as being sacred. Under AIRFA, allowing access to sacred sites, if so desired by Native Americans, should be a prime consideration of federal land management agencies. Additionally, Executive Order 13007--Indian Sacred Sites, May 24, 1996, states that federal agencies such as BLM must "to the extent practicable and not clearly inconsistent with essential agency functions, accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites." Under the Land Exchange alternative, access to sites on the selected lands that have been identified by tribes as being traditional cultural properties and/or sacred would be under the control of PDSI.

Under this alternative, 15 of the 43 archaeological sites on the selected lands identified by tribes as traditional cultural properties would be physically impacted by foreseeable mining uses (Table 4-35). Three additional sites, AZ CC:2:200, 211, and 234 had the potential to be impacted, but PDSI has agreed to avoid them because the sites have been identified as sacred places as well as traditional cultural properties. PDSI also has agreed to create a buffer zone around AZ CC:2:200, construct a fence around AZ CC:2:211, and allow Native Americans access to the sites with sufficient notice.

Table 4-34. Traditional Cultural Properties that Would be Affected by the Loss of Federal Oversight under the Land Exchange Alternative

AZ CC:2:132	AZ CC:2:152	AZ CC:2:193	AZ CC:2:208	AZ CC:2:215	AZ CC:2:222	AZ CC:2:229
AZ CC:2:146	AZ CC:2:153	AZ CC:2:194	AZ CC:2:210	AZ CC:2:217	AZ CC:2:223	AZ CC:2:231
AZ CC:2:147	AZ CC:2:186	AZ CC:2:195	AZ CC:2:211	AZ CC:2:218	AZ CC:2:225	AZ CC:2:233
AZ CC:2:148	AZ CC:2:188	AZ CC:2:196	AZ CC:2:212	AZ CC:2:219	AZ CC:2:226	AZ CC:2:234
AZ CC:2:149	AZ CC:2:191	AZ CC:2:200	AZ CC:2:213	AZ CC:2:220	AZ CC:2:227	AZ CC:2:261
AZ CC:2:151	AZ CC:2:192	AZ CC:2:207	AZ CC:2:214	AZ CC:2:221	AZ CC:2:228	FS 998
						FS 999

Table 4-35. Sites Identified by Indian Tribes as Being Traditional Cultural Properties that Would be Directly Impacted by the Foreseeable Uses of the Selected Lands

Dos Pobres/San Juan Project			Dos Pobres Sulfide/Lone Star Projects	
AZ CC:2:148	AZ CC:2:191	AZ CC:2:215	AZ CC:2:146	AZ CC:2:194
AZ CC:2:149	AZ CC:2:192	AZ CC:2:225	AZ CC:2:147	AZ CC:2:226
AZ CC:2:151	AZ CC:2:193		AZ CC:2:188	
AZ CC:2:152	AZ CC:2:213			

The Dos Pobres/San Juan Project would destroy or damage ten sites on selected lands identified by tribes as traditional cultural properties. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies (Production Operations and Support) would likely destroy or damage five such sites. Although sites considered by tribes to be traditional cultural properties are located in the Intermittent Use areas, they would not be impacted because the types of activities anticipated for this category can avoid sites.

- < **Offered Lands.** Under the Land Exchange alternative, the known and unknown archaeological resources on the offered lands would come under the protection of federal legislation such as NHPA and NAGPRA. Although none of the 11 tribes consulted identified specific traditional cultural properties on any of the offered lands, the Hopi and Zuni consider all prehistoric archaeological sites within these lands to be traditional cultural properties (SWCA 1998 and 2000). Any traditional cultural properties occurring on the offered properties would benefit from protection under federal land ownership.

**4.4.4.2.2 No Land Exchange Alternative.** In the short term, sites on the selected lands identified by tribes as traditional cultural properties would not be physically affected by mining. They would remain under BLM management and be subject to consideration under NHPA, AIRFA, and Executive Order 13007, particularly regarding access to sacred sites by Native Americans who wish to visit the sites. Over the long term, however, it is reasonable to assume that mining activities would proceed on portions of the selected lands.



In that case, impacts to sites on the selected lands identified by tribes as traditional cultural properties are expected to be the same as those described under the Proposed Action alternative.

Traditional cultural properties on the offered properties, if any occur, would also be unaffected by this alternative. They would remain in private ownership, outside of federal oversight responsibilities. Treatment of these sites and access to them would be at the discretion of the landowner.

## **4.4.5 Socioeconomic Resources**

### **4.4.5.1 Population and Demographics**

#### **4.4.5.1.1 Land Exchange Alternative**

- < **Selected Lands.** No impacts to the local Safford population is expected as a result of the exchange. The impacts of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.1.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect population size and demographics in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.
- < **Offered Lands.** The Land Exchange alternative would not affect local or regional population size or demographics in or near the offered lands.

**4.4.5.1.2 No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect the current population size and demographics in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

### **4.4.5.2 Local and Regional Economy**

#### **4.4.5.2.1 Employment**

##### **< Land Exchange Alternative**

- C **Selected Lands.** No impacts to local or regional economy are expected as a result of the exchange. The impacts on employment of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect employment in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

- C **Offered Lands.** The Land Exchange alternative would not affect local or regional employment in or near the offered lands.
- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect employment in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### 4.4.5.2.2 Income

- < **Land Exchange Alternative**
  - C **Selected Lands.** The exchange would not affect the per capita income of the residents of Graham County. The impacts on income of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.2 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect income in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.
  - C **Offered Lands.** The Land Exchange alternative would not affect local or regional income in or near the offered lands.
- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect income trends in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### 4.4.5.2.3 Taxes

- < **Land Exchange Alternative**
  - C **Selected Lands.** The exchange would result in a long-term increase in private property tax revenues for Graham County, as the selected lands would be taxed as private lands with mining/industrial uses. The impacts on taxes of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.2.3 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect taxes in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

Under the Land Exchange alternative, the impacts on local taxes of the foreseeable mining uses of the selected lands as described in the MPO would be identical to those presented

in Section 4.6.1 under the Proposed Action alternative, with the following exceptions: 1) Graham County would lose the payments in lieu of taxes (PILT) now paid by BLM for the selected lands. On the basis of \$1.16 per acre, this loss would total \$19,634 (ESI 1997). 2) Graham County would gain an undeterminable amount in annual property taxes after PDSI acquired the selected lands. The amount cannot be estimated because PD's real properties in Graham County are determined annually "in bulk," that is, a single figure is derived that represents the value of both improved and unimproved property (ESI 1997).

The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect tax revenue in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

- C Offered Lands.** The Land Exchange alternative would not affect local or regional taxes in or near the offered lands. Under this alternative, each offered property would be removed from the tax roles of the county in which it is located, and PILT payments by the federal government would increase in that county (ESI 1997). Table 4-36 shows the expected tax loss and PILT gain by county and offered property. The Land Exchange alternative would result in a total net loss of \$5,595.00 in revenue each year.

Table 4-36. Annual Tax Revenues Lost and PILT Payments Gained Under the Land Exchange Alternative by County and Offered Property

County	Tax Loss Per Property	Tax Loss	PILT Gain Per Property	PILT Gain	NET Gain or (Loss)
Offered Property					
Graham County		\$113.00		\$1,085.00	\$972.00
Amado Property	\$22.00		\$209.00		
Curtis Property	\$91.00		\$876.00		
Pima County		\$2,496.00		\$835.00	(\$1,661.00)
Feulner Property	\$74.00		\$371.00		
Clyne II Property	\$2,422.00		\$464.00		
Santa Cruz County		\$1,101.00		\$278.00	(\$823.00)
Schock Property	\$1,101.00		\$278.00		
Cochise County		\$1,080.00		\$1,261.00	\$181.00
Musnicki Property	\$155.00		\$742.00		
Freeland Property	\$292.00		\$162.00		
Butler-Borg Property	\$633.00		\$357.00		
Yavapai County		\$4,640.00		\$376.00	(\$4,264.00)
Tavasci Marsh Property	\$4,640.00		\$376.00		
<b>TOTAL</b>		<b>\$9,430.00</b>		<b>\$3,835.00</b>	<b>(\$5,595.00)</b>

Source: ESI 1997

- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect tax revenues in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### 4.4.5.3 Infrastructure

##### 4.4.5.3.1 Housing

- < **Land Exchange Alternative**

- C **Selected Lands.** No impacts to local housing supply or demand are expected from the exchange. The impacts on local housing supply and demand of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could potentially affect housing supply and demand in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

- C **Offered Lands.** The Land Exchange alternative would not affect housing supply or demand in or near the offered lands.

- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect the current local housing supply or demand in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

##### 4.4.5.3.2 Utilities (Water, Electric/Gas, Sewer, Telephone, Garbage)

- < **Land Exchange Alternative**

- C **Selected Lands.** The impacts on local utilities services from the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.2 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies would affect utilities in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

- C **Offered Lands.** The Land Exchange alternative would not affect local utilities service in or near the offered lands.

- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect local utilities services in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### **4.4.5.3.3 Schools**

- < **Land Exchange Alternative**

- C **Selected Lands.** The impacts on local schools of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.3 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect schools in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the magnitude or significance of those effects.

- C **Offered Lands.** The Land Exchange alternative would not affect schools near the offered lands.

- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect schools in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### **4.4.5.3.4 Emergency Response**

- < **Land Exchange Alternative**

- C **Selected Lands.** The impacts on local emergency response services of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.3.4 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect such services in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.

- C **Offered Lands.** The Land Exchange alternative would not affect local emergency response services in or near the offered lands.

- < **No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect local emergency response services in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### 4.4.5.4 Transportation

##### 4.4.5.4.1 Land Exchange Alternative

- < **Selected Lands.** The impacts on local transportation of the foreseeable mining uses of the selected lands as described in the MPO are presented in Section 4.3.5.4.1 under the Proposed Action alternative. The more distant foreseeable uses related to development of the Dos Pobres sulfide and Lone Star orebodies could affect transportation in the Safford area, but no information is yet available about the scale of the mining operations, so predictions cannot be made regarding the significance of those effects.
- < **Offered Lands.** The Land Exchange alternative would not affect transportation in the vicinity of the offered lands except as it relates to issues of access (see Section 4.4.1.2.1, Offered Lands).

**4.4.5.4.2 No Land Exchange Alternative.** The No Land Exchange alternative would not, in and of itself, affect local transportation in Graham County or in or near the offered lands. However, it is reasonable to expect that mining would take place in the Safford area as BLM must subsequently respond to the mine plan proposal (Proposed Action); therefore, impacts identical to those of the Proposed Action would be expected to occur.

#### 4.4.6 Indian Trust Resources

##### 4.4.6.1 Land Exchange Alternative

**4.4.6.1.1 Selected Lands.** The act of disposal of public lands *per se* to PD, without reference to the proposed mining operations, would not directly or indirectly impact Indian trust assets. Under this alternative, BLM is neither acquiring nor disposing of resources identified as Indian trust lands, tribal water rights, hunting or fishing rights, or other resources considered to be Indian trust resources (assets).

The near-term foreseeable mining uses of the selected lands (the Dos Pobres/San Juan Project), however, are predicted to physically result in reduced surface flows in the Gila River and its tributaries totaling a maximum of 149 af/yr as discussed in Section 4.3.2.6.2. Although this predicted impact is not measurable, PD has elected to offset this physical effect on Gila River flows by implementing the Alternate Year Fallowing Program, which would reduce consumptive use of river flows for irrigation by more than three times the predicted impact. As a consequence, surface flows, associated riparian habitat, and downstream Indian water rights to the Gila River will not be adversely impacted by the Project.

Future potential implementation of long-term foreseeable mining uses of the selected lands (the Dos Pobres sulfide and the Lone Star projects) could result in additional or continued impacts to flows of the Gila River and its tributaries. It is expected that any potential future impacts to Gila River flows associated with these projects would also be fully mitigated, therefore, adverse impacts to surface flows of the Gila River as a result of long-term foreseeable uses are not anticipated.

In addition to rights to surface flows in the Gila River, the San Carlos Apache Tribe holds an Indian trust asset in all groundwater under the Reservation based upon Sections 4.0 and 4.3 of the San Carlos Apache Tribe Water Rights Settlement Agreement of March 30, 1999, to which the United States was a signatory. This Agreement states that such rights “are held by the United States in trust for the Tribe,” and that the scope thereof is “...a permanent right to the on-Reservation diversion, use, and storage of all Groundwater beneath the Reservation....” Impacts of the Dos Pobres/San Juan Project foreseeable uses on Indian trust assets would be identical to those described in Section 4.3.6.1 for the Proposed Action alternative.

Groundwater under the San Carlos Apache Reservation could be affected by the more distant foreseeable uses associated with Dos Pobres sulfide and the Lone Star projects. However, impacts cannot be predicted at this time because no information is yet available about the scale of these potential future mining operations and their potential water requirements. It is expected that a detailed analysis of impacts, including for trust assets such as the San Carlos Apache Tribe’s groundwater, would be prepared when and if those potential projects are formally proposed.

**4.4.6.1.2 Offered Lands.** No Indian trust resources would be impacted as a result of public acquisition of the offered lands.

#### **4.4.6.2 No Land Exchange Alternative**

The No Land Exchange alternative would not, in and of itself, impact any Indian trust resources on either the selected or offered lands. However, if BLM subsequently selects a mining plan alternative, impacts to Indian trust resources would be identical to those described for the Proposed Action alternative.

## **4.5 CUMULATIVE IMPACTS**

### **4.5.1 Approach**

Cumulative effects analysis was undertaken following the requirements of NEPA and BLM regulations and policy. The objective of this analysis is to place the consequences of the Project into the context of other past actions, present actions, or reasonably foreseeable future actions (RFFAs), both federal and non-federal, to ensure that decisions stemming from this EIS consider the full range of potential Project consequences (CEQ 1997).

Five steps were taken to analyze cumulative effects associated with the Dos Pobres/San Juan Project. Each step is listed and briefly discussed below:

- 1) Identify cumulative effects issues;
- 2) Identify the temporal and spatial extent of the study area;
- 3) Identify Past, Present, and Reasonably Foreseeable Future Actions (RFFAs) relevant to each issue;
- 4) Establish the baseline/trend for the resources considered; and
- 5) Analyze cumulative effects.

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While all of the impacts on affected resources are probably cumulative, the purpose of the first step is to limit cumulative effects analysis to important issues of national, regional, or local significance (CEQ 1997). Therefore, not all issues identified for direct and indirect impact assessment (refer to Table 1-4 in Chapter 1) have been analyzed for cumulative effects. The selection of issues for cumulative impacts consideration is based upon the scoping issues raised and the experience and expertise of the Interdisciplinary (ID) Team.

After considering the nature of direct and indirect effects, the resources and/or components of the environment identified by the ID Team for cumulative impact assessment include:

- < Land Use
  - Land Tenure
  - Visual Resources
- < Physical Resources
  - Air Quality
  - Ground Water Resources
  - Surface Water Resources
  - Waters of the United States
- < Biological Resources:
  - Vegetation and Wildlife
  - Threatened & Endangered Species
- < Cultural Resources
- < Socioeconomic Resources
- < Indian Trust Assets

These are resources that, after consideration of the Proposed Action, past actions, present actions, and RFFAs, are most likely to experience some level of cumulative impact within the spatial and temporal boundaries of this analysis or are locally, regionally, or nationally significant.

Steps 2 and 3 are, by their nature, interrelated; past, present, and RFFAs largely define the temporal and spatial extent of the study area. The completion of Steps 2, 3, and 4 provides the framework or context for consideration of cumulative effects discussed in the next section.

This assessment has been updated since the publication of the Draft EIS to reflect changes in the context of the analysis, modifications in the proposed Mine Plan of Operations (summarized in Table 2-1), and the public comments received after review of the Draft EIS. It analyzes resource management and development actions planned or projected to occur under each alternative. Projections of RFFAs, which have been developed for analytical purposes only, are based on current conditions and trends and represent a best professional estimate of RFFAs. Unforeseen changes in such factors as economics, demand, and federal, state, and local laws and policies could result in different outcomes than those projected for this analysis of cumulative effects.

### 4.5.2 Context

The framework in which the cumulative effects were considered is provided below. Past and present actions are commonly a major influence over the baseline/trend data for a resource, and RFFAs can likewise be



expected to influence future resource trends. Therefore information on past and present actions, RFFAs, and baselines/trends is presented together to provide the context for cumulative effects analysis provided in Section 4.5.3.

#### **4.5.2.1 Temporal and Spatial Extent of the Study Area**

Temporal and spatial boundaries for cumulative effect analysis vary by resource/issue. Rather than define multiple, arbitrary boundaries for each resource/issue, the ID Team reviewed each of the issues identified for cumulative effects analysis and identified the past actions, present actions, and RFFAs appropriate for a particular resource's cumulative impact analysis. The list of past actions, present actions, and RFFAs was updated for the Final EIS. Updates were provided by the ID team and by telephone interviews with a number of federal and state resource and land management agency personnel. The results of those interviews are provided in Table 4-37. Past, present, and reasonably foreseeable future actions that have been added to this assessment have been included in Table 4-38. These actions were then compiled and categorized by locationzone (distance from the proposed project area). This list of actions presented in Table 4-38 and graphically depicted in Figure 4-18 defines the temporal and spatial boundaries of this analysis.

Projects are divided into three broad temporal categories: past actions, present actions, and RFFAs. This compilation of projects reflects the collective experience and knowledge of the ID Team. These projects are considered because of their relevance to one or more of the issues identified for cumulative impacts analysis. The projects listed include those that have only recently been completed or are ongoing (such as the telescope construction projects on Mount Graham) as well as projects that have been components of the regional landscape for many decades, such as the mining activities at Morenci and agricultural uses of surface water and groundwater in the Safford Valley.

Projects identified as RFFAs are those projects that: 1) the ID Team is aware of and would classify as reasonably foreseeable, i.e., not overly speculative; and 2) have the potential to contribute to cumulative effects. Projects considered here include the Dos Pobres sulfide, Lone Star, and Sanchez projects in the Safford Mining District. These projects are reasonably likely, although not certain, to occur during or after completion of the mining activities of the proposed Project. A brief discussion of the more notable mine and land exchange projects that are considered in this analysis is provided below.

#### **4.5.2.2 Mining - Past and Present Actions and RFFAs**

Past mining activities have been prolific in the southeastern part of the state, with most of the mining and prospecting activities focused upon copper, gold, silver, lead, zinc, and/or tungsten. Very few of these old workings have been adequately reclaimed because regulations that required reclamation of mining activities on public lands were not in effect until 1981, and it was only in 1995 that the State of Arizona enacted mine reclamation laws for non-federal lands. Past copper mining activities have been mostly underground operations and were done before the commercial development of the SX/EW process. There are a number of old unreclaimed workings and tailings piles; the most notable ones nearest the Safford Mining District are located in the Aravaipa Mining District, some 45 miles west of Safford.

Table 4-37. Resource and Land Management Agency Responses Regarding Identification of Past, Present, and Reasonably Foreseeable Future Actions

Agency	Date of Contact	Response
Arizona Game and Fish Department	11-13-02	Various wildlife studies with BLM along the Gila River, Gila Box, and Bonita Creek areas
Arizona Department of Transportation	11-15-02	Highway reconstruction along US 191 between US 70 and SR 75
Arizona State Land Department	11-19-02	5-6 miles of FHWA multi-use trails Record of commercial activities within T6S, R25E, Sections 16 and 36; T6S, R26E, Sections 16 and 32; and T7S, R26E, Section 2 Record of grazing activities within T5S, R25E, Sections 7,8,9,10,11,12,15,17,18,22, and 31; T5S, R26E, Sections 10, 15, 16, 17, and 21; and T7S, R25E, Sections 5, 8, 9, 10, 15, 16, 17, 18, and 32
City of Safford Department of Public Works	11-12-02	Records show pending mineral excavation activities within T5S, R25E, Sections 10, 11, and 15 by Kennecott Exploration Co. Planned reconstruction of Safford 8 <sup>th</sup> Avenue Bridge Design and construction of arterial 20 <sup>th</sup> Avenue from Route 7 to Relation Street Improvements to the Safford Airport Access Road, taxi-way, and navigation features 5 to 6 miles of FHWA multi-use trails along Discovery Park Blvd. and Discovery Avenue
Graham County Planning and Zoning Department	11-23-02	Improvements to the City of Safford Airport Privatization of the Safford Landfill
The Nature Conservancy	11-23-02, 12-11-02	Overall little development activity expected in the area Identified the "Sonoran Desert Ecoregional Plan" and Apache Highlands
United States Fish and Wildlife Service	11-13-02	Consultation with BLM on St. John's land exchange
Bureau of Land Management Safford Field Office	12-03-02	Completion of In-Lieu Selection of federal land owed to the State of Arizona (Arizona State Land Department), primarily in the St. John's area Land exchange with Fort Huachuca, BLM, and State of Arizona Highway-191 re-routing Valley Telephone Co-operative fiberoptic line from I-10 to Safford

The vast majority of 3809 fillings in the Safford Field Office are now reclaimed and closed. There are only about 12 open Notices of Intent (NOI) currently filed with the Safford Field Office. NOIs are mining activity involving less than five acres. The majority of these in the Safford Field Office are for exploration. Only two NOIs currently have any regular production activity. There are also presently three active Mining Plan of Operations in the Safford Field Office, only one of which is an active mine operation. This active MPO is for a series of zeolite pits in the San Simon Valley, with a total disturbed area of approximately 75 acres.

The only significant current mining operation anywhere near the Gila Mountains is the PD Morenci Mine complex, located on private land about 30 miles northeast of Safford. This is one of the largest open-pit copper mine operations in the world, producing oxide copper amenable to SX/EW. It is also important to note that the Dos Pobres/San Juan Project is the only major new copper mine currently planned in the U.S. (L. Thrasher, BLM, pers. comm.).

#### 4.5.2.3 Land Use/Tenure - Past and Present Actions and RFFAs

From the end of fiscal year 1964 through fiscal year 1993, the acreage of federal land managed nationwide by the four federal land management agencies (BLM, U.S. Forest Service [USFS], United States Fish and Wildlife Service [USFWS], and National Park Service [NPS]), decreased by 11 percent, or approximately 77 million acres (General Accounting Office [GAO] 1995). However, the amount of land managed by these four agencies increased in 46 states and in the District of Columbia by almost 21 million acres. The largest decrease in acreage occurred in Alaska, where a total of nearly 96 million acres of land managed by the BLM was transferred to the State of Alaska (76 million acres) and to Native Alaskans (36 million acres) (ibid.). During this same period, an additional 16 million acres of land in Alaska were added to the inventory of lands managed by the USFS, USFWS, and NPS.

Table 4-38. Other Activities (Existing and Proposed) That May Cumulatively Affect Resources

Activity	Location Zone <sup>1</sup>	Status <sup>2</sup>	Anticipated Environmental Effect Which Could Be Cumulative <sup>3</sup>
1. Dos Pobres Sulfide Project	A	F	A, SW, GW, V, V&W, C, <b>SE</b>
2. Lone Star Project	A	F	A, SW, GW, V, V&W, C, <b>SE</b>
3. Sanchez Copper Project	A	F	A, SW, GW, V, V&W, C, <b>SE</b>
4. Morenci Mine	B	P, E, F	A, SW, GW, V, V&W, T&E, C, <b>SE</b>
5. Agricultural Practices Safford Valley	A	P, E, F	SW, GW, T&E, <b>SE</b>
6. Agricultural Development San Carlos Apache Reservation	B	E, F	SW, GW, T&E, <b>SE</b>
7. Gila Box Riparian National Conservation Area	A, B	E, F	<b>SW, V&amp;W, T&amp;E, C, SE</b>
8. BLM Grazing ESA Consultation with USFWS	A, B, C	E	<b>SW, V&amp;W, T&amp;E</b>
9. BLM Grazing Leases	A, B, C	P, E, F	SW, V&W, T&E
10. Mt. Graham Telescope Development	B	E, F	V&W, V, T&E, C
11. CMMC Leach Expansion Project	C	F	A, SW, GW, V, V&W, C, <b>SE</b>
12. ASARCO Ray Land Exchange	C	P	<b>SW, GW, V, V&amp;W, T&amp;E, C, SE</b>
13. Safford Conventional WWTP and Reuse Project	A	F	<b>SW, GW</b>

Table 4-38, continued. Other Activities (Existing and Proposed) that may Cumulatively Affect Resources

Activity	Location Zone <sup>1</sup>	Status <sup>2</sup>	Anticipated Environmental Effect Which Could Be Cumulative <sup>3</sup>
14. City of Safford Water Development Bonita Creek	A	E, F	SW, GW, V&W, T&E
15. Thatcher Wetland WWTP and Reuse Project	A	E	<b>V&amp;W, SW</b>
16. San Simon Valley Restoration Project	B, C	P	<b>V&amp;W, SW, GW, T&amp;E</b>
17. AGFD Ash Creek Water Development Project	B	F	<b>V&amp;W, SW</b>
18. Gila Monster (Non-point source working group)	C	F	<b>SW, GW, T&amp;E</b>
19. National Forest Lands and Fire Management	C	P, E, F	SW, V, V&W, T&E, <b>SE</b>
20. Abandoned Mines	B	P	SW, GW
21. Gila River Indian Community agricultural development	C	P, E, F	SW, GW, V&W, T&E, C, <b>SE</b>
22. Chino Mine Expansion	C	F	A, SW, GW, V, V&W, C, <b>SE</b>
23. Continental Mine Expansion	C	F	A, SW, GW, V&W, <b>SE</b> , C
24. Copper Flat Project	C	F	A, SW, GW, V&W, SE
25. Little Rock Mine	C	F	A, SW, GW, V&W, <b>SE</b>
26. Morenci Land Exchange	C	E	<b>SW, GW, V&amp;W, T&amp;E, C, SE</b>
27. San Manuel Mine Closure	C	P, E, F	A, SW, GW, V&W, T&E, SE
28. BHP Pinto Valley Operations Closure	C	P, E, F	A, SW, GW, V&W, T&E, SE
29. Carlota Copper Co.	C	E, F	A, SW, GW, V&W, T&E, C, SE
30. Arizona Desert Wilderness Act	C	P	<b>V&amp;W, T&amp;E, A, SW, GW, C, V, SE</b>
31. Wild & Scenic Rivers Proposed Designations	A,B,C	E, F	<b>V&amp;W, T&amp;E, A, SW, GW, V, C, SE</b>
32. The Nature Conservancy Activities – San Pedro River, Ramsey Canyon, and Mule shoe Ranch	B,C	P, E, F	<b>V&amp;W, T&amp;E, SW, GW, SE, C</b>
33. Fort Huachuca Operations	C	E, F	A, V&W, T&E, SW, GW, SE
34. Existing Environmental Regulations (CWA, CAA, APP, ESA, NHPA, etc.)	A,B,C	P, E, F	<b>A, V&amp;W, T&amp;E, SW, GW, C, V</b>
35. BLM/Arizona State Land Exchanges (Mule Shoe Ranch, San Pedro River, Cienega Creek)	B,C	P	<b>V&amp;W, T&amp;E, SW, GW, V, SE, C</b>
36. BLM Hualapai Mountain Exchange	C	F	<b>V&amp;W, T&amp;E, SW, GW, V, SE, C</b>
37. Mission Mine Expansion	C	F	A, SW, GW, V&W, T&E, SE, C
38. Gila River Indian Community Farm Expansion	C	P, E, F	A, SW, GW, V&W, T&E, SE, C
39. Construction of 8 <sup>th</sup> Ave Bridge -- Safford	A	F	SW, V&W, T&E
40. Hwy US-191 reconstruction	A	F	SW, V, V&W, T&E, C
41. Residential Development – Safford Area	A	F	SW, V, GW, V&W, T&E, C, <b>SE</b>
42. The Nature Conservancy Sonoran Desert Ecoregional Plan	A, B, C	F	<b>SW, V&amp;W, T&amp;E, C</b>
43. Gila Adjudication/Indian Water Settlement	A, B, C	F	SW, GW

Table 4-38, continued. Other Activities (Existing and Proposed) that may Cumulatively Affect Resources

Activity	Location Zone <sup>1</sup>	Status <sup>2</sup>	Anticipated Environmental Effect Which Could Be Cumulative <sup>3</sup>
44. Valley Telephone Co-operative Fiberoptic Line -I-10 to Safford	A	F	<b>SE</b>
45. Various AGFD and BLM wildlife studies along the Gila River, Gila Box area, and Bonita Creek	A, B	E, F	<b>V&amp;W, T&amp;E</b>
46. FHWA Multi-Use Trails - Safford Area	A	F	<b>V, SE</b>
47. BLM - Commercial Activities	A, B, C	E, F	A, SW
48. BLM - Kennecott Exploration Co. Activities	A, B	F	A, SW, GW, V&W, T&E, C, <b>SE</b>
49. Improvements to City of Safford Airport	A	E, F	<b>SE</b>
50. Design and Reconstruction of Arterial 20 <sup>th</sup> Avenue - Safford	A	F	<b>SE</b>
51. Fort Huachuca-BLM-State of Arizona Land Exchange - St. John's area	C	F	A, SW, GW, V&W, T&E, C, SE
52. Delegation of NPDES Program to the State (ADEQ)	A, B, C	E, F	<b>SW</b>

1. A = 0-25 kilometers (km), B = 26-100 km, C = >100 km

2. F =future activity, E=existing activity, P=past activity

3. A=air, SW=surface water, GW=ground water, V=visual, V&W=vegetation & wildlife, T&E = listed species, C= cultural resources, SE=socioeconomic, **Bold** denotes a positive impact)

Table 4-39. Change in the Acreage Managed by Four Federal Agencies in Arizona

Federal Agency	Acres Managed		Net Acreage - Gain (Loss)
	1964	1993	
BLM	13,034,217	14,255,889	1,221,672
NPS	2,474,249	2,692,176	217,927
USFS	11,410,808	11,247,052	(163,756)
USFWS	6,977	1,672,499	1,665,522
<b>TOTAL</b>	<b>26,926,251</b>	<b>29,867,616</b>	<b>2,941,365</b>

Source: GAO 1995

The GAO (1995) reported that of the roughly 72,688,000 acres of land in Arizona, 29,867,616 (41 percent) are managed by one of four federal land management agencies. Table 4-39 summarizes the change in acreage of lands managed by these federal land management agencies in Arizona from 1964 to 1993.

Cumulatively, the lands subject to the multiple resource management objectives of the BLM or USFS and the management goals of the NPS and USFWS have increased by almost 2.9 million acres during this 30-year period. Arizona BLM experienced a net gain of approximately 1,221,672 acres of public lands (GAO 1995). Within the Safford Field Office, major land tenure adjustments in the past have included acquisitions of aquatic and upland resources within the Cienega Creek and San Pedro River corridors, acquisition of lands

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surrounding the Muleshoe Ranch, and most recently acquisitions through the Morenci Land Exchange of inholdings within the Gila Box RNCA and Dos Cabezas Mountains Wilderness and disposal of encumbered public lands near the Morenci Mine.

From 1998 to 2002 a total of 96,366 acres of land has been acquired by BLM and 88,781 acres of land have been disposed of by the BLM through land exchanges (B. Ruddick, BLM, pers. comm.). Table 4-40 summarizes these changes in land status by year that resulted in a net gain in BLM managed public lands of 7,585 acres.

The U.S. Forest Service is currently pursuing 14 land exchanges in Arizona. These exchanges, if completed, would result in 10,784 acres of private land becoming public lands managed by the USFWS and 6,190 acres of public lands becoming privately owned (L. Odegaard, USFS, Southwestern Region, email to T. Furgason, SWCA). This would result in a net public land increase of 4,594 acres. However, the State of Arizona recently acquired 15,234 acres of federal lands owed to the State under the Arizona Enabling Act of June 20, 1910. The State has selected existing Federal lands administered by BLM in Apache County, Arizona, to satisfy their claim. This transfer of ownership is expected to be completed during the late fall of 2002. Additionally, The Defense Authorization Act of 2000 (P.L. 106-651, 113 Stat. 877, 878) provided for the friendly condemnation of State Trust lands within the East Range of Fort Huachuca in southeastern Arizona. BLM is assisting in this condemnation by providing the federal lands to the State of Arizona as compensation for the condemnation. Fort Huachuca selected 1,536 acres of surface estate in the East Range for condemnation. As compensation, the Arizona State Lands Department selected 5,903 acres of federal surface estate in Apache County, Arizona (B. Ruddick, BLM Arizona State Office, pers. comm.). Table 4-41 summarizes the land tenure adjustments considered for this analysis and shows a net loss of 1,669 acres of federal lands in Arizona (although it could be argued that the federal lands to be provided to the State of Arizona could still be considered "public" lands).

Table 4-40. BLM Land Exchange Summary 1998 to July 2002		
Year	Acres Acquired	Acres Disposed
1998	6,971	9,556
1999	71,448	64,620
2000	0	0
2001	17,947	14,605
2002 (as of July 22)	0	0
<b>TOTAL</b>	<b>96,366</b>	<b>88,781</b>

### 4.5.2.4 Resource Baselines/Trends

Where possible, baseline conditions or trends were established from existing sources of information. This information was then supplemented by input from the ID Team based upon their experience and expertise.

Table 4-41. Potential Net Change in Public Lands Tenure as a Result of Recent/Ongoing Exchanges and Adjustments by the BLM and USFS in Arizona

<b>Exchange</b>	<b>Selected Lands (acres) (Federal to Non-Federal Ownership)</b>	<b>Offered Lands (acres) (Private to Federal Ownership)</b>	<b>Net Federal Acreage Gain (Loss)</b>
Safford Exchange Alternative	16,297	3,867	(12,430)
Morenci Land Exchange	3,758	1,040	(2,718)
Ray Land Exchange	10,976	8,994	(1,982)
BLM-State Lands In-lieu Selection	15,234	0	(15,234)
BLM-Fort Huachuca-ASLD Condemnation	1,536	5903	(4,367)
USFS Arizona Land Exchanges	6,190	10,784	4,594
<b>TOTAL</b>	<b>43,124</b>	<b>41,455</b>	<b>(1,669)</b>

These data are presented in both quantitative and qualitative formats. It should be noted that, in analyzing cumulative effects of an alternative, if that alternative has no direct or indirect impacts, it cannot contribute cumulatively to impacts on a given resource.

A trend analysis of surface water quality in the upper Gila River was completed by the USGS in 1995 (Baldys et al. 1995). The study was based upon data collected between 1972 and 1987. Two of the sites were located on the Gila River (Calva, Arizona and Redrock, New Mexico) and one was located on the San Francisco River near Clifton, Arizona. Table 4-42 summarizes the data presented in that study and in ADEQ's 1996 Arizona Water Quality Assessment (ADEQ 1996), which also used these data. Findings and conclusions at these three sites, by site, included (after ADEQ 1996):

- < Total phosphorus, dissolved lead, total manganese, and dissolved zinc declined, while ammonia plus organic nitrogen increased at the Clifton, Arizona site;
- < Dissolved solids, sodium, sulfate, and chloride were decreasing, while total lead was increasing at the Redrock, New Mexico site; and
- < Hardness, dissolved solids, sodium, sulfate, chloride, total phosphate, dissolved lead, total manganese, and dissolved zinc were decreasing, while pH was increasing at the Calva site downstream of the Town of Safford.
- < These data provide general indications of the cumulative effects of historic activities on water quality in the Gila River upstream from and in the vicinity of the proposed Project. The general activities reflected by the results of the measured water quality parameters include, but are not limited to, irrigation practices including return flows, historic and extant mining activities, and urban runoff from developed portions of the watershed.

In their CWA 305b Report, ADEQ (1996) also reported that:

- < Past monitoring efforts at the Morenci Mine had detected contaminated water in Gold Gulch, a tributary to the San Francisco River. This water is now being captured on-site and pumped back to the mine for use as process water (ADEQ 1996); and

Table 4-42. Summary Statistics and Surface Water Quality Trend Analysis.

Data compiled from USGS Water-Resources Investigations Report 95-4083 (Baldys et. al. 1995). Units for summary statistics indicated next to water quality constituent name. Number in ( ) under mean is sample size. Trend refers to the temporal trend of the water quality constituent at the indicated sample location. N= no trend, I = increasing, and D = decreasing. Trend conclusions based on p=0.1 level of significance. '-' = data not available or not calculated. mg/l = milligrams per liter or parts per million and : /l = micrograms per liter or parts per billion.

Water Quality Constituent	Location											
	Gila River Near Red Rock, NM [collection period 9/73 to 9/87]				San Francisco River near Clifton, AZ [Collection period 1/76 to 9/87]				Gila River at Calva, Arizona [Collection period 10/74 to 9/87]			
	Mean (n)	Median	Range	Trend	Mean	Median	Range	Trend	Mean	Median	Range	Trend
pH	-(191)	8.2	6.9 -9.1	N	-(105)	8.2	6.9 - 9.6	N	-(133)	8.2	6.8 -9.8	I
Turbidity (NTU)	158 (64)	10	<0.01 - 6,500	N	87.7 (31)	5.5	0.60 1,500	N	472 (101)	40	0 - 21,000	N
Hardness (mg/l)	115 (141)	120	46 - 180	N	221 (109)	230	70 - 440	N	521 (142)	420	63 - 1,300	D
Dissolved Solids (mg/l)	221 (89)	229	68 - 349	D	676 (109)	630	178 -1,830	N	2060 (142)	1700	244 - 4,680	D
Dissolved Sodium	28.7 (139)	31.0	7.8 - 44.0	D	142 (83)	130	17 - 420	N	525 (142)	425	2.5 - 1,200	D
Dissolved Sulfate (mg/l)	32.8 (141)	34	<1.0 - 49.0	D	30.6 (109)	30.0	2.0 - 79.0	N	341 (142)	280	30.0 - 810	D
Dissolved Chloride	11.8 (141)	12	2.0 - 44.0	D	257 (83)	230	16 - 870	N	786 (145)	590	31 - 2,200	D
Total Ammonia + Org. N (mg/1)	0.80 (77)	0.47	0.10 - 11.0	N	1.08 (83)	0.40	0.01 - 18.0	I	2.01 (142)	0.80	0.10 - 74.0	D
Total Phosphorus (mg/l)	0.25 (77)	0.09	0.02 - 4.40	N	0.50 (82)	0.10	0.01 - 7.90	D	0.98 (146)	0.19	0.01 - 21.0	N
Dissolved Arsenic (µg/l)	1.74 (45)	2	<1.0 - 4.0	N	2.40 (25)	2.0	1.0 - 4.0	N	4.38 (88)	4.0	<1.0 - 8.0	D
Dissolved Barium (µg/l)	23.5 (41)	20.0	6.0 - 50.0	N	40.0 (24)	34.0	12.0 - 100	N	95.9 (75)	56	15.0 - 600	N
Total Boron (µ/l)	40 (2)	40	40 - 40	-	151 (45)	150	50 - 100	N	674 (64)	705	110 - 13,00	N
Dissolved Chromium	0.41 (36)	0.02	<1.0 - 10.0	N	0.78 (24)	0.67	<1.0 - 2.0	N	1.59 (85)	0.56	<1.0 - 3200	N
Suspended Copper (µ/l)	40.4 (16)	10.0	<1 - 410	N	27.7 (6)	22.0	3.0 - 63.0	-	137 (31)	20.0	<5 - 1,500	N
Total Copper (µ/l)	37.2 (19)	7.76	3.0 - 420	N	229 (110)	26.5	<1 - 10,000	N	152 (124)	43.0	<1 - 3,200	N
Dissolved Lead (µ/l)	1.39 (41)	1.00	<1.0 - 5.00	N	1.52 (61)	1.00	<1.0 - 12.0	D	3.41 (95)	1.00	<1.0 - 70.0	D
Total Lead (µ/l)	20.1 (23)	5.0	<1.0 - 330	I	11.8 (75)	5.5	<2.0 - 84.0	N	26.6 121)	8.0	<1.0 - 400	N
Total Manganese (µ/l)	685 (19)	40	8.0 - 11,000	N	321 (69)	110	10.0 - 3,900	D	953 (166)	300	8.0 - 11,000	D
Dissolved Zinc (µ/l)	11.8 (44)	8.0	<3.0 - 1,280	N	32.7 (65)	10.0	<3.0 - 600	D	20.5 (96)	11.50	<3.0 - 210	N
Total Organic Carbon (mg/1)	6.64	3.80	1.90 - 54.0	N	7.21	2.4	0.50 - 87.0	N	19.9	8.00	3.6 - 300	N



Table 4-43. Summary of Selected Stream/River Segment Data from the ADEQ June 2002 305(b) Report

Stream Segment	Year added to 303(d) List	Designated Use Support	Stressors	Comments
<b>Eagle Creek</b>				
Willow Creek to Sheep Wash	2000	Inconclusive	Turbidity	Turbidity standard exceeded in 1 of 4 samples. "Inconclusive" for A&Ww.
Sheep Wash to Gila River	1998	Inconclusive	Turbidity	Standards were exceeded in 3 of 10 samples. "Inconclusive" for A&Ww due to turbidity.
<b>Bonita Creek</b>				
Park Creek to Gila River	1997	Attaining	--	19 samples at 5 sites in 1997-2000. Reach assessed as "attaining all uses".
<b>San Francisco River</b>				
Blue River to Limestone Gulch	1998	Inconclusive	Turbidity, Beryllium	13 samples in 1997-2000. "Inconclusive" for A&Ww and FC due to turbidity and beryllium exceedances. "Attaining" for all other uses.
Limestone Gulch to Gila River	1992	Impaired	Turbidity	33 samples at 2 sites in 1996-2000. "Impaired" for A&Ww due to turbidity (exceeded 9 of 33 samples); turbidity levels "Attaining" for all other uses. Exceedances occurred in beryllium, copper, dissolved oxygen, Escherichia coli, and fecal coliform but "Attaining" for all uses.
<b>Gila River</b>				
San Francisco River to Eagle Creek	1998	Inconclusive	Turbidity	12 samples at 2 sites in 1997-2000; "Inconclusive" in A&Ww for turbidity; "Attaining" in all other uses.
Eagle Creek to Bonita Creek	1990	Inconclusive	Turbidity	12 samples in 1997-1998; "Inconclusive" for A&Ww due to turbidity exceedances; "Attaining" in all other uses.
Bonita Creek to Yuma Wash	1990	Not Supporting	Turbidity	6 samples collected by ADEQ and 27 by USGS in 1996-2000. "Impaired" for A&Ww by turbidity. Exceedances in Escherichia coli and fecal coliform but "Attaining" for designated uses.

- < PD applied for an Aquifer Protection Permit for its Morenci facility. In the process of developing this permit, all surface and groundwater concerns should be addressed for this site (ADEQ 1996). (Note: On October 26, 2000, Phelps Dodge Morenci, Inc. was issued its APP for the Morenci Mine Facilities.)

Table 4-43 summarizes selected data from ADEQ 2002 305(b) report. The data presented are from stream/river segments in the general vicinity of the project area. As indicated by these data, several of the stream/river segments do not support their designated use. In all instances, the primary stressor was turbidity.

The discharge rate of the Gila River as it flows through the Safford Valley is roughly 284cfs (205,560 af/yr). The lowest annual average is 87 cfs (62,970 af/yr) and the highest is 1,119 cfs (810,660 af/yr). Consumptive water use for agriculture (combined groundwater pumping and surface water diversion) in the Safford valley is estimated to be 153,000 af/yr (211 cfs). The City of Safford obtains its water for municipal and industrial uses from wells located within the Safford Valley and from a diversion on Bonita Creek. The City's diversion structure is an infiltration gallery located in the channel-fill of the creek approximately four miles upstream of the confluence of Bonita Creek and the Gila River. Total withdrawals from the Gila Valley basin in 1985 were about 8,000 af (ADWR website @<http://adwr.state.az.us>).

Of all the resources being considered for cumulative impacts, conclusions regarding biological resources seem most sensitive to the spatial scale of analysis. On a local basis (the Safford Valley), discussions of cumulative impacts vary significantly from those that consider a larger analysis area.

At the local scale, past, present, and reasonably foreseeable future actions that most affect biological resources are:

- < The potential mine-related RFFAs in the Safford Mining District;
- < Future increases in water demand, if unmitigated; and
- < Past and present agricultural activities in the Safford Valley.

Past agricultural development in the Safford Valley totals about 32,500 acres (Graham County Cooperative Extension, pers. comm., 1997) and has resulted in the clearing of extensive areas of riparian (broad-leaf and mesquite bosque) habitats within the Valley. Continued consumptive water use for irrigated lands of an estimated 153,000 af (211 cfs) of water annually from the Gila River and its alluvial aquifer for agricultural purposes continues to affect the distribution and characteristics of aquatic and riparian resources within and downstream of the Safford Valley. Added to these past and present impacts is the potential for a total of 11,675 acres of additional surface disturbance with full implementation of mine-related RFFAs within the Safford Mining District.

At a regional or statewide scale of analysis, localized impacts that result or would result from past, present, and RFFAs become less significant. Past, present, and RFFAs that shape the nature of potential cumulative impacts to biological resources at a regional or statewide scale include:

- < The net increase in the acreage of federally managed public lands that has taken place since 1964;
- < The net decrease of about 15,600 acres of public lands that would result from implementation of the Land Exchange alternative and other RFFAs listed in Table 4-41, which represents about 0.05 percent of the overall net gain in federal lands in Arizona since 1964;

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- < The establishment of wilderness areas and other special management actions such as the Gila Box Riparian National Conservation Area and the establishment of the four BLM staff positions dedicated to the management of the Gila Box;
- < Mandated changes in the renewable resources management focus and practice by the BLM, USFS, and other agencies as a result of recent litigation by environmental groups; and
- < Private/public initiatives such as the Gila Monster (a non-point source working group actively seeking solutions to non-point source water pollution issues along the Gila River) and The Nature Conservancy's active management role in southeastern Arizona (e.g. the San Pedro River and Muleshoe Ranch).

To a large extent, land acquisitions by federal land management agencies have focused on lands with high biological resource values and/or lands that facilitate the multiple resource management objectives of the managing federal agency. Of particular importance in these acquisitions has been the identification of lands with known populations of threatened and endangered species or lands with the potential to support threatened or endangered species. Specific examples of land acquisitions in southern Arizona by federal agencies to support and manage biological resources include the establishment and expansion of the Buenos Aires National Wildlife Refuge, land acquisitions along the San Pedro River, the Cienega Creek land exchange, the Muleshoe Ranch exchange, and past and proposed expansions of Saguaro National Park.

As outlined in Chapter 3, dominant habitats in the project area include Sonoran Desertscrub, Semidesert Grassland, and a broad ecotone combining elements of these two biotic communities. In Arizona, Upland Sonoran Desertscrub and Semidesert Grassland biotic communities cover approximately 10,379,00 acres and 6,892,000 acres, respectively.

Upland habitats throughout much of Arizona are crossed by numerous ephemeral drainages, the majority of which support xeroriparian vegetation. Xeroriparian vegetation in the project area is generally open and patchily distributed. As is typical of xeroriparian vegetation, most of the plant species present also occur in adjacent upland habitats, although at lower densities and generally in smaller sizes.

Based upon xeroriparian vegetation volume and composition, xeroriparian habitats in the project area are of relatively low value. Within the project area, creosotebush, not normally considered to be a riparian plant, comprised 30.4, 23.0, and 33.9 percent of the vegetation volume in the three categories, respectively, of xeroriparian habitat identified in the project area (SWCA 1997a). The average vegetation volume of all xeroriparian habitats measured in the project area was less than  $0.42 \text{ m}^3/\text{m}^2$  (ibid.). Compared to many areas of southern Arizona, this volume of xeroriparian vegetation is low. While many of the more characteristic Upland Sonoran Desertscrub habitats in southern Arizona support vegetation volumes greater than  $0.5 \text{ m}^3/\text{m}^2$ , upland habitats in the project area supported an average vegetation volume of  $0.24 \text{ m}^3/\text{m}^2$  (ibid.).

Surface management activities of the federal land management agencies have been affected by recent legal actions initiated by the Center for Biodiversity and other special-interest groups. As a result of a Notice of Intent to Sue, BLM entered into Section 7 Consultation with the USFWS regarding potential impacts to threatened and endangered species from ongoing implementation of BLM grazing programs. The BLM is actively implementing terms, conditions, and conservation measures outlined in the final biological opinion issued by the USFWS that resulted from this consultation (M. McQueen, BLM, pers. comm.). Fifteen grazing allotments are affected by the terms, conditions, and conservation measures that have resulted from this consultation. The net result of this consultation was removal of cattle from riparian habitats in the Safford Field

Office, which would affect five of these allotments (ibid.). It is expected that habitat values of riparian and aquatic habitats will be enhanced in these areas as a result of this action.

### **4.5.3 Analysis of Cumulative Effects**

#### **4.5.3.1 Mine Plan Alternatives Set**

##### **4.5.3.1.1 Land Use**

The land use evaluation of cumulative impacts focuses on two categories: Land Tenure and Visual Resources. Land Tenure focuses upon the changes in federal land ownership that have or are likely to take place in the future on a state-wide basis. The Visual Resources section discusses the likely cumulative impacts to visual resources in the Safford Valley.

#### **< Land Tenure**

- C Proposed Action Alternative.** The proposed mining plan of operations will not contribute to cumulative effects that may be associated with the adjustment of land tenure and the resulting changes in land management goals and objectives. Selection of the Proposed Action alternative by the BLM would result in not acquiring the approximately 3,867 acres of lands within Long-Term Management Areas (LTMA's) and the potential benefits that result from changes in land management goals and objectives for these properties. Selection of this alternative by the BLM will also result in no disposal of 16,297 acres of public lands, all of which is encumbered by active PD mining claims and could be subject to patent in the future. After considering historic changes in public land tenure in Arizona and the resource management benefits that have occurred as a result, significant cumulative impacts are not expected from the selection of the Proposed Action alternative. Some portion or all of the 16,297 acres of selected lands could be subject to privatization through the patent process should the congressional moratorium be lifted at some time in the future. Permitting of the Proposed Action alternative by the cooperating agencies with permit authority would result in no cumulative effects upon land tenure.
- C Partial Backfill Alternative.** Cumulative impacts that would result from selection of this alternative are expected to be similar to those identified for the Proposed Action alternative.
- C No Action Alternative.** Under this alternative, the net cumulative increase in lands subject to multiple resource management objectives of the four federal land management agencies since 1964 will still exceed 2.9 million acres. And while selection of the No Action alternative would not result in the acquisition of offered lands nor the disposal of selected lands for the anticipated resource value and/or public lands management benefit, this alternative is not expected to result in significant adverse cumulative effects to federal land tenure. Some portions of selected lands could be subject to privatization by patenting should the current moratorium on second-stage patents be lifted.

#### **< Visual Resources**

- C Proposed Action Alternative.** The Proposed Action would create landscape features, most notably the development rock stockpiles and the leach pad, that strongly contrast with the form and line of the existing landscape. The color of the development stockpiles and the

leach pad will be similar to the colors of the Gila Mountains and would provide a weak contrast to the surrounding terrain. Because of the Project's distance from key observation points, no contrast in the texture of the Proposed Action with surrounding landforms is expected.

When considered in the context of RFFAs anticipated for the Safford Valley, specifically, the potential Lone Star, Dos Pobres sulfide, and the Sanchez projects, the Proposed Action alternative will contribute cumulatively to visual impacts to the northern viewsheds of the Safford Valley. Detailed mine plans for the Dos Pobres sulfide and the Lone Star projects have not been developed and the Sanchez Project MPO would likely be revised substantially prior to the initiation of any mining activity on that property (J. Korolsky, PDSI, pers. comm.). It is expected that, collectively, these RFFAs will result in an estimated 11,675 acres of additional mining-related disturbance. Facilities developed as part of these RFFAs will be generally similar in line, form, and color to the Proposed Action. Likely exceptions to this would be the sand-colored tailings impoundment developed as part of the Dos Pobres sulfide project and the development of the Lone Star open cut which, because of its location near the top of Lone Star Mountain, is expected to be more visible than the pits excavated for the Dos Pobres and San Juan ore bodies on the bajada of the Gila Mountains.

- C **Partial Backfill Alternative.** When considering the Project's distance from key observation points and the nature of RFFAs, selection of this alternative will result in cumulative effects similar to those of the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to visual resources in the Safford Valley.

#### 4.5.3.1.2 Physical Resources

The discussions and analysis of cumulative impacts to physical resources are focused upon three distinct resources: Air Quality, Groundwater, and Surface Water Resources. The spatial context for this analysis is the Safford Mining District.

##### < Air Quality

- C **Proposed Action Alternative.** As outlined in Section 4.3.2.2 of the DEIS the original mine plan of operations would have generated emissions that range from 5.0 to 66.2 percent of the established standards or guidelines (refer to Tables 4-7 and 4-8 from Section 4.3.2.2 of the Draft EIS). However, as outlined in Table 2.1 of this document, the Proposed Action Alternative has been refined. The proposed MPO will result in reduced haul truck traffic, reduced off-site vehicle trips for acid delivery, and reduced fugitive dust emissions from use of conveyors to move agglomerated ore instead of haul trucks. These increased efficiencies will significantly reduce the air emissions originally projected for mine operations evaluated in the DEIS. Additional development of mine-related RFFAs in the Safford Mining District would potentially increase concentrations of regulated pollutants within the Safford Valley. The degree to which concentrations of these pollutants would increase is a function of the timing of potential new development activities as well as mine design and control technologies implemented for any new development activities. For example, timing is important in that concentrations of some pollutants, such as PM<sub>10</sub>, that would potentially be

generated by development of the Dos Pobres sulfide project may be offset to some degree by reductions in pollutant concentrations that result from reduced activities at the Dos Pobres/San Juan Project in its later phases.

Development of mine-related RFFAs or other industrial sources of air pollutants in the Safford Valley will require compliance with applicable ADEQ air quality control regulations. Under these regulations, future development of mine-related RFFAs by PDSI would require either modifying the Class II permit that must be obtained for the Dos Pobres/San Juan Project or obtaining a new permit prior to construction. Any permitting action by ADEQ would contain terms and conditions to ensure that the proposed facility will meet all applicable requirements and standards.

Cumulatively, the concentration of certain criteria air pollutants is likely to increase in the Safford Valley as a result of growth and implementation of RFFAs. However, the degree to which pollutant concentrations can increase from regulated activities or sources (including mine-related RFFAs) is regulated and limited by ADEQ. Through their permitting authority, ADEQ must ensure that criteria air pollutant concentrations at process boundaries for mine-related or other industrial RFFAs do not exceed applicable air quality standards.

- C **Partial Backfill Alternative.** Cumulative effects to air resources of the Gila River Valley are expected to be similar to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not contribute to cumulative impacts to air resources in the Safford Valley.

## < **Groundwater Resources**

- C **Proposed Action Alternative.** Local and regional groundwater impacts were modeled for an approximately 500 square-mile region that contains the Dos Pobres/San Juan Project (URS 2002). The purpose of the model was to predict effects, if any, on regional groundwater flow from proposed development of two open-pit mines and groundwater production wells needed to support the mine. The model was not used to predict cumulative effects that would result from potential future development of the Dos Pobres sulfide, Lone Star, or Sanchez projects.

Since completion of initial modeling efforts and the publication of the Draft EIS, Phelps Dodge has proposed revisions to the Mine Plan of Operations as outlined in Table 2-1 of this document. These modifications will reduce the anticipated total amount of groundwater used during the life of the Project by about 20 percent (from an average of 4,272 gpm to about 3,431 gpm). In response to public comments and changes in the mine plan, the model presented in the DEIS has been revised and refined and is now referred to as the 2002 model (URS 2002).

Development of mine-related RFFAs in the Safford Mining District are likely to result in increased long-term groundwater impacts beyond those predicted for the Dos Pobres/San Juan Project. These increased impacts are likely to result from the short-term impacts associated with increased pumping from production wells, and the longer-term impacts associated with development of a deeper pit and/or additional pits within the mining district.

Cumulative impacts to the regional groundwater flow system are not expected to adversely impact known production wells of other municipal or industrial water users within the Safford Valley. Specific impacts to surface water resources as a result of changes in regional groundwater flow associated with implementation of mine-related RFFAs by PDSI are not known at this time. However, impacts from mine-related RFFAs are expected to increase beyond those predicted by the groundwater model for the Dos Pobres/San Juan Project. These effects will be more accurately predicted in the future, as monitoring programs for the Dos Pobres San Juan Project (see Section 4.9 and Appendix F) help to refine the regional groundwater model's predictive capabilities and as each RFFA is subjected to required environmental permitting and review.

Cumulative impacts to regional groundwater quality will be minimized by the protections inherent in Arizona's APP program. Included within APP permit that would have to be issued for any of the mine-related RFFAs in the Safford Mining District will be requirements to:

- C Demonstrate compliance with BADCT design standards to minimize the potential for facilities to impact groundwater quality;
- C Establish points of compliance at which the operator must demonstrate to ADEQ that potentially discharging facilities have not caused or contributed to exceedances of aquifer quality standards;
- C Establish an alert monitoring system to provide early detection of potential problems;
- C Develop contingency plans that clearly state procedures for implementing remedial actions; and
- C Develop closure plans and post-closure monitoring plans for each potentially discharging facility.

Implementation of these programs will not only protect local groundwater systems, but will also contribute to the protection of water quality within the Gila River and Bonita Creek and their tributaries within the Safford Valley.

- C **Partial Backfill Alternative.** Cumulative effects to groundwater resources of the Safford Valley are similar to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and the cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not contribute to adverse cumulative impacts to groundwater resources in the Safford Valley.

#### < **Surface Water Quantity**

- C **Proposed Action Alternative.** Cumulative adverse impacts to surface water quantity are not expected to result from implementation of the Dos Pobres/San Juan Project. Impacts of the Proposed Action to surface water quantity in the Gila River have been described in detail in Sections 4.3.2.5.1 and 4.3.2.6.1 of this document. Two potential sources of impact were identified: retention/detention features incorporated into the mine's stormwater management

facilities and the cone of depression from pumping and pit development. Some stormwater management features of the mine are designed to and will retain stormwater runoff that comes into contact with mine facilities in order to prevent discharge of pollutants to downstream resources. It is estimated that these facilities will decrease tributary runoff to the Gila River by approximately 94 af on an annual basis (Dames & Moore 1998). The second potential source of impact to river flow is a consequence of the cone of depression that is predicted to form in the vicinity of the Project as a result of groundwater pumping during the life of the mine, and the residual impacts of pit lake evaporation on groundwater flow following mine closure. The impact from these groundwater effects is expected to gradually reduce the river's surface flows by a maximum total of approximately 55 af/yr at about 450 years after Project initiation; this total includes predicted groundwater discharge into the pit lakes of 21 acre-feet/year (URS 2002). Together, the total predicted maximum annual impact of the proposed Project from surface water management, groundwater pumping, and pit lake effects is predicted to be 149 af/yr on Gila River flows.

As indicated in proposed water resources mitigation programs for the Dos Pobres/San Juan Project, predicted potential impacts to surface flows in the Gila River or Bonita Creek would be mitigated by PD through the Alternate Year Fallowing Program. Mitigation measures reflect the desire to avoid and minimize any potential indirect impacts to the physical resources that support the Gila River riparian corridor and its biota.

As a result of a proposed mitigation and monitoring plan (outlined in Section 4.9 and in Appendix F), detailed groundwater monitoring and model recalibration efforts will be implemented to verify or refine current projections of the Project's impacts to the regional groundwater system. The Alternate Year Fallowing Program will be implemented to mitigate for the predicted maximum impact to Gila River flows.

The average annual benefit to the Gila River system from the Alternate Year Fallowing Program is estimated to be 480 af/yr, 331 af/yr more than the 149 af/yr of predicted maximum total annual impact of proposed mine-development activities to the Gila River system.<sup>48</sup> This is more than three times the amount of mitigation needed to offset currently predicted model impacts. If, after completion of model recalibration, total maximum impacts to the Gila River are predicted to exceed 480 af/yr, PD will fallow additional decreed acreage to offset any model predicted increases in Project effects at a minimum 1:1 ratio.

As outlined in the MMP provided as Appendix F, the proposed Alternate Year Fallowing Program will have a net benefit to the Gila River system. A significant portion of the predicted impacts (ephemeral stormwater runoff reductions) is associated with episodic flash flood events. Conversely, the benefit to the Gila River from reduced agricultural consumptive use occurs throughout the growing season, during periods of normally reduced or intermittent flow conditions, the period of greatest potential environmental stress to riparian systems found along the Gila River. This benefit is furthermore demonstrated in light of:

- C The ephemeral nature of surface water flows affected by proposed mine development compared to the seasonal, perpetual benefits of the Alternate Year Fallowing Program;

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<sup>48</sup> Calculation of the annual benefit was determined by multiplying the Annual Consumptive use determined from five years of recorded agricultural activities at the farms that will be used in the Alternate Year Fallowing Program by the total acreage of land that will be fallowed each year. Therefore: 2.4 af/yr/acre\*200 acres = 480 af/yr.



- C The 480 af/yr reduction in consumptive water use is three times higher compared to the maximum total predicted impacts of 149 af/yr; and
- C The maximum modeled impacts to the Gila River system will not occur for approximately 450 years after the Project and then are predicted to decrease after that point; in comparison, the benefits of reduced water consumption of the Alternate Year Following Program would commence immediately upon Project authorization and extend in perpetuity.

It is unlikely that mine-related RFFAs within the Safford Mining District would have unmitigated impacts to surface water resources of the Gila River because of:

- C The standing and legal status of aboriginal and decreed surface water rights on the Gila River;
  - C Resource agency concerns for biological resources (riparian vegetation, endangered species, critical habitat, etc.) along the Gila River near the Safford Mining District;
  - C Federal Endangered Species Act compliance requirements; and
  - C The monitoring, evaluation, and mitigation requirements incorporated into the Mitigation and Monitoring Plan for the proposed Dos Pobres/San Juan Project, and the mitigation and monitoring measures that would be required of future mining-related RFFAs.
- C **Partial Backfill Alternative.** Cumulative effects to surface water resources of the Gila River are similar to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative impacts to surface water quantity in the Safford Valley. The surface water resources associated with offered lands at Tavasci Marsh and Bonita Creek will also not be placed into public ownership and management.

#### < Surface Water Quality

- C **Proposed Action.** No significant cumulative impacts to surface water quality are expected from development of the Dos Pobres/San Juan Project because of:
  - C The generally positive trends in water quality within the Gila River;

- C Features of the Project that respond to the substantive requirements of the CWA<sup>49</sup>, which regulates point source and non-point source discharges to waters of the United States;
- C The requirement of the Project to adhere to the Arizona's Aquifer Protection Program permit, which regulates discharges to groundwater resources;
- C Specific management activities<sup>50</sup> currently underway to minimize or eliminate sources of surface water pollution within the Gila River watershed.

The Project storm water management design is conservative in that it is based upon the 100-yr/24-hr design storm event concurrent with a 24-hr power outage and BADCT standards, which greatly diminish the potential risk for accidental discharge of contaminants into both surface and groundwater systems. However, no design standard can guarantee, with absolute certainty, that there will not be an accidental discharge. If there is a discharge, it would most likely occur during extremely rare instances of increased surface water runoff that exceed the design standard. The high volumes of water associated with a storm event of a magnitude that would exceed Project design standards would also dilute such discharges. The risks of discharges are further reduced through implementation of a Spill Prevention Control and Countermeasures (SPCC) Plan, Stormwater Pollution Prevention Plan, and by the 6+ mile distance between the proposed Project and the Gila River, the nearest perennial surface water system. Thus, while these risks are generally comparable to the risks presented by other municipal, industrial, and agricultural uses within the Upper Gila watershed, the potential for cumulative impacts to water quality is very low and limited to periods of rare extreme storm events.

- C **Partial Backfill Alternative.** Cumulative effects to surface water resources of the Gila River are identical to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to surface water quality in the Safford Valley.

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<sup>49</sup> The Clean Water Act includes a number of substantive provisions that regulate the discharge of pollutants to the Gila River. These programs include: Section 401 which requires state the state to certify the discharge of dredged and fill material will not violate state water quality standards; Section 402 which regulates the point source and non-point source discharge of pollutants to waters of the United States; and Section 404 which regulates the discharge of dredge and fill material to waters of the United States. The principal federal agencies responsible for these programs are the ADEQ and the Corps, which is a cooperating agency for this EIS. These agencies would have oversight and permitting authority for all RFFAs that have the potential to discharge pollutants to surface water resources.

<sup>50</sup> These projects include recent APP activities at the Morenci Mine, the Gold Gulch Surface Water Management project, and the Gila Monster, an interstate watershed program consisting of more than 70 interested parties. The Gila Monster was formed to develop and implement strategies for management of non-point source loadings into the 8,500,000-acre Upper Gila watershed.

< **Waters of the U.S.**

- C **Proposed Action Alternative.** As discussed in section 4.3.2.6.5, a total of 114.6 acres of waters of the United States will be directly or indirectly impacted by development of the proposed Dos Pobres/San Juan Project. The majority of these impacts are indirect (93.2 acres) and result from stormwater diversions and reduction in contributory watershed area. Only 21.4 acres of waters of the United States will be directly impacted by fill or excavation activities. For waters of the United States indirectly impacted by the proposed Project, the impact to identified functions is estimated to be a maximum of 50 percent at any point within the areas of indirect impact. Thus, the COE is requiring mitigation for 68 acres of waters of the United States [21.4 acres + (93.2 acres x 0.5) = 68 acres of mitigation].

Development of other foreseeable mining projects in the Safford Mining District (Lone Star, Dos Pobres sulfide, and Sanchez) is estimated to increase the acreage of waters of the United States affected by these projects to approximately 295 acres (including impacts from the Dos Pobres/San Juan Project). The acreage of mitigation required for direct and indirect impacts to waters of the United States from reasonably foreseeable future mining activities in the district, including the Dos Pobres/San Juan Project, is approximately 200 (WestLand Resources 1998). This cumulative mitigation requirement is based upon an analysis similar to that used to determine mitigation requirements for the Dos Pobres/San Juan Project.

- C **Partial Backfill Alternative.** Cumulative impacts to waters of the United States are expected to be similar to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to waters of the United States.

**4.5.3.1.3 Biological Resources**

The discussions and analysis of cumulative impacts to biological resources are presented in the next two sections: Vegetation and Wildlife; and Threatened and Endangered Species and Designated or Proposed Critical Habitat.

< **Vegetation and Wildlife**

- C **Proposed Action Alternative.** Given the past impacts to upland and riparian habitats that have resulted from development and continued operation of agricultural activities in the Safford Valley, and the potential impacts that would result from full development of 11,675 acres of mine-related RFFAs, the Project would contribute to cumulative impacts to vegetation and wildlife in the Safford Valley. However, on a regional or statewide scale these impacts are not considered cumulatively significant. This conclusion is supported by:
- C The acquisition of over 2.9 million acres of public lands in Arizona since 1964;
- C The widespread distribution and relatively low value of upland and xeroriparian habitats that will be impacted by proposed development of the Dos Pobres/San Juan Project;

- C Land tenure RFFAs (including the Land Exchange alternative) that would result in a loss of less than one percent of the net increase in federal public lands since 1964; and
- C Legally mandated changes in the renewable resources management focus and practice by the BLM and the USFS as a result of recent court actions by special-interest groups.
- C **Partial Backfill Alternative.** Cumulative impacts to vegetation and wildlife resources are expected to be similar to those associated with the Proposed Action alternative.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects to vegetation and wildlife resources.

< **Threatened and Endangered Species/Designated or Proposed Critical Habitat**

- C **Proposed Action Alternative.** Formal Section 7 consultation was initiated by the BLM for this project in May 1999 and was concluded in June 2002. The USFWS in their biological opinion concluded that the proposed Project or the proposed mitigation activities would not jeopardize the continued existence of southwestern willow flycatcher. While transitory effects may have occurred as a result of salt cedar eradication at the Pima mitigation site, the site is expected to remain suitable for the flycatcher and in fact follow-up surveys have shown a substantial increase in the number of nesting flycatchers at this site. The USFWS did not anticipate any take of an endangered species or adverse effects to proposed or designated critical habitat resulting from implementation of the proposed action and therefore, no adverse cumulative impacts are anticipated.
- C **Partial Backfill Alternative.** Cumulative impacts to threatened and endangered species and designated or proposed critical habitat are not expected.
- C **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative impacts to threatened and endangered species or designated or proposed critical habitat.

**4.5.3.1.4 Cultural Resources**

- < **Proposed Action Alternative.** This alternative would contribute to the total number of archaeological sites impacted by development, however, actions to avoid physical impacts to sacred Indian sites have been successfully incorporated into the MPO. Affected cultural resources on federal lands are subject to consideration under NHPA, NAGPRA, AIRFA, Executive Order 13007, and other federal laws and regulations. This protection extends to sites on private land potentially affected by actions requiring federal approval. Under federal law, the responsible federal agency must develop mitigation, or treatment, plans for affected sites eligible for inclusion in the National Register of Historic Places. Agencies must also consult with Indian tribes that claim cultural affiliation with a project area to develop plans for handling potential burials, to identify TCPs and sacred places in the project area, and to develop treatment plans for such sites.

Treatment plans for archaeological sites and sacred sites may include avoidance of the site, protection of the site by buffer zones and/or fencing, and guaranteed access to sacred sites. When avoidance is not possible, treatment generally consists of a program to gather information from or about the site, using means appropriate to the site (e.g., data recovery, records search, and interviews with knowledgeable individuals). Because of these measures, a substantial amount of information has been or will be accumulated about the prehistoric and historic occupation of the region. Information is being gained, but the physical site itself is also being irrevocably lost. Some tribes have expressed that, in their view, this loss is unmitigable.

Considering: 1) the land tenure adjustments outlined in Section 4.5.2.3 that have resulted in significant increases in federal public land holdings in Arizona; and 2) compliance with cultural resource regulations by federal, state, and local land jurisdictions, the loss of information and understanding that historically resulted from the unmitigated destruction of archaeological sites has been reduced significantly over the past several decades. The implementation of a state and federally approved data recovery program with extensive involvement and participation by interested Native American groups as a condition of the proposed project will mitigate for potential adverse direct and indirect effects. The mitigation program minimizes the loss of information and data regarding the history and prehistory of the region, provides for the appropriate treatment of any human remains encountered, and provides for the preservation in place of sacred sites in a manner acceptable to the consulted Native American groups. This further reduces potential cumulative impacts of the proposed project. In this context, the implementation of the Proposed Action alternative is not expected to result in significant adverse cumulative impacts to cultural resources.

- < **Partial Backfill Alternative.** Cumulative effects of this alternative on cultural resources would be the same as those described under the Proposed Action alternative.
- < **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies will maintain the existing conditions of the Dos Pobres and San Juan mine sites and will not result in adverse cumulative effects on cultural resources.

#### 4.5.3.1.5 Socioeconomic Resources

- < **Proposed Action Alternative.** As outlined in Section 4.3.5, socioeconomic effects of the Proposed Action alternative stem from additional employment and revenue generated by the Proposed Action. The total construction and operations payroll over the life of the Project is estimated to be \$214 million. Cumulatively, taxes paid by PD (excluding employee income taxes) for property, sales, income, payroll, construction, and severance taxes are estimated to total more than \$420 million during the Project's 16-year life.

From 1995 to 2005, the total number of new households in Graham County is expected to increase by 3,466 (ESI 1997). Implementation of the Proposed Action alternative will create approximately 145 new households; 108 from direct employment and 37 from indirect employment. This represents approximately 5.9 percent of projected population increase and 3.5 percent of the projected new home demand for Graham County. For mine-related RFFAs, there are no specific economic data from which to estimate cumulative effects. Conservatively, mine-related RFFAs within the Safford area could extend the direct effects outlined above by an additional 20 years (J. Korolsky, PDSI, pers. comm.). The degree of increased economic activity that results from mine-related RFFAs will be largely dependent upon the degree of overlap that occurs among these mine-related RFFAs.

Anticipated growth and the subsequent increased demand for public services that would result from the Proposed Action are relatively small percentages of the projected growth for Graham County area for the 1995 to 2005 period. New demands on infrastructure resulting from the Project are disproportionately small relative to the socioeconomic benefits from additional tax revenues that would be generated directly and indirectly by the Project; cumulative impacts to socioeconomic resources of the Safford area are expected to be positive.

- < **Partial Backfill Alternative.** Cumulative effects of the Partial Backfill alternative would be similar to the effects of the Proposed Action alternative.
- < **No Action Alternative.** Selection of the No Action alternative by the BLM and cooperating agencies would not significantly affect the existing and projected growth patterns of the region, however, the Project's cumulative economic contributions in the form of various local, state, and federal taxes would not accrue to the economic development of the region.

#### **4.5.3.1.6 Indian Trust Assets**

- < **Proposed Action Alternative.** As outlined in Section 4.3.6.1, the proposed action is not expected to result in any significant adverse impact to Indian trust assets. Proposed mitigation for predicted physical impacts to surface water of the Gila River are expected to result in a net benefit to the river; the very slight increase in the current rate of groundwater flow from the San Carlos Apache Reservation southward towards the Gila River and the nearly zero decline in the groundwater table on the Reservation is unmeasurable and not considered significant. Considering these effects in the context of past, present, and reasonably foreseeable future actions, the proposed project is not expected to result in significant adverse cumulative effects to Indian trust assets.
- < **Partial Backfill Alternative.** Cumulative effects of the Partial Backfill alternative would be similar to the effects of the Proposed Action alternative.
- < **No Action Alternative.** Selection of the No Action alternative by the cooperating agencies would not result in any significant adverse impact to Indian trust assets.

#### **4.5.3.2 Land Exchange Alternatives Set**

Two alternatives are presented: the Proposed Land Exchange alternative and the No Land Exchange alternative. Under the No Land Exchange alternative, BLM's land management responsibility for the selected lands would remain unchanged and mining operations have been assumed to proceed through implementation of the proposed Mining Plan of Operations or the Partial Backfill alternative presented in the Mine Plan Alternatives Set.

##### **4.5.3.2.1 Land Use**

The land use evaluation of cumulative impacts focuses on two categories: Land Tenure and Visual Resources. Land Tenure focuses upon the changes in federal land ownership that have or are likely to take place in the future on a state-wide basis. The Visual Resources discussion centers on the likely cumulative impacts to visual resources in the Safford Valley.

## Land Tenure

- < **Land Exchange Alternative.** Considering past, present (in process), and RFFA land tenure adjustments and the nature and values of the resources proposed for public acquisition through the Safford Land Exchange, the exchange alternative is not expected to have a significant adverse cumulative impact to public land tenure and management. Table 4-33 summarizes the net change in acreage of land management responsibilities for both the USFS and BLM that have or are reasonably expected to occur as a consequence of this land exchange as well as others in the foreseeable future.

Since 1964, the BLM, USFS, NPS, and USFWS combined have acquired management responsibility for more than 2.9 million acres of public lands to facilitate and enhance their resource management objectives in Arizona. The land exchanges currently being considered by the BLM and USFS (Table 4-33) continue these management-focused activities (see discussions in section 4.5.2.4 for additional information relating to biological resources on the offered and selected lands). The net reduction in federal lands (1,669 acres) that would result from the land tenure adjustments currently being considered by the BLM and USFS in Arizona represents about 0.05 percent of the net gain in federal lands in Arizona that occurred from 1964 to 1993.

All of the federal land exchanges currently in process or proposed are being evaluated under the guidelines and requirements of NEPA and must be consistent with the broader planning goals and objectives of the lead land management agency. For example, land acquisition objectives by the Safford Field Office are defined by their Resource Management Plan (BLM 1991, 1994b). Within this plan, the Safford Field Office has identified 24 LTMA's in which the BLM will intensively retain and manage public lands for their multiple resource values. Within these LTMA's the BLM intends to retain all public land and may seek to acquire state and private lands located therein. Future land acquisitions in the Safford Field Office through either exchange or purchase by the BLM will focus on improving agency management capabilities and protecting critical or important natural resources.

Permitting of the Proposed Action alternative by the COE, should the BLM select the Land Exchange alternative, will not result in significant adverse cumulative impacts to public lands tenure.

- < **No Land Exchange Alternative.** No cumulative impacts are expected as a result of implementation of this alternative. Any effects would be similar to those reported in discussion of the cumulative effects of the proposed mining plan of operations or the partial backfill alternative. With selection of the No Land Exchange alternative by the BLM, approximately 3,543 acres of lands within Long-term Management Areas (LTMA) will not be acquired and the potential benefits that result from changes in land management goals and objectives for these properties will not be realized. Selection of this alternative by the BLM will also not result in disposal of 16,297 acres of public lands, all or some of which could be subject to patent in the future. After considering historic changes in public land tenure in Arizona and the resource management benefits that have occurred as a result, significant cumulative impacts to public land tenure are not expected from the selection of the No Land Exchange Alternative.

- < **Visual Resources**

C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to visual resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in the creation of landscape features, most notably the development rock stockpiles and the leach pad, that strongly contrast with the form and line of the existing landscape. The color of the development stockpiles and the leach pad will be similar to the colors of the Gila Mountains and will provide a weak contrast to the surrounding terrain. Because of the distance from key observation points, no contrast in the texture of the proposed action with surrounding land forms is expected. It is expected that collectively, the RFFAs within the Safford Mining District will result in an estimated 11,675 acres of additional mining-related disturbance and implementation of the Proposed Action or the Partial Backfill Alternatives, in conjunction with the proposed land exchange, will have cumulative effects.

- C **No Land Exchange Alternative.** When considering the distance from key observation points and the nature of RFFAs, selection of this alternative will result in cumulative effects similar to those identified for the proposed land exchange alternative.

#### 4.5.3.2.2 Physical Resources

The discussions and analysis of cumulative impacts to physical resources are focused upon three distinct resource elements; Air Quality, Groundwater Resources, and Surface Water Resources.

##### < Air Quality

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative effects to air resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE would result in the cumulative impacts to air resources described for the Proposed Action alternative.

- C **No Land Exchange Alternative.** Cumulative effects to air resources of the Gila River Valley would be the same as those associated with the Proposed Action alternative (the Dos Pobres San Juan Project Mining Plan of Operations).

##### < Groundwater Resources

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to groundwater resources in the Safford Valley.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE would result in the cumulative impacts to groundwater resources described for the Proposed Action alternative.

- C **No Land Exchange Alternative.** Cumulative effects to groundwater resources of the Safford Valley would be the same as those associated with the Proposed Action alternative.



< **Surface Water Quantity**

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in significant adverse cumulative effects to surface water resources in the Safford Valley. Acquisition of the offered lands by the BLM will result in a net gain of surface water rights by the BLM of approximately 700 af/yr. Significant surface water features that will be acquired through the exchange include 324 acres of wetland and adjacent upland habitats at Tavaschi Marsh (SWCA 1996b) and 935 acres consisting of the Curtis and Amado properties, which contain hydriparian and aquatic resources associated with Bonita Creek in the Gila Box RNCA (ibid.).

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to surface water quantity following implementation of mitigation measures outlined in the Mitigation and Monitoring Plan included as Appendix F to this document.

It is unlikely that mine-related RFFAs within the Safford Mining District would have unmitigated impacts to surface water resources of the Gila River because of:

- C The standing and legal status of aboriginal and decreed surface water rights on the Gila River;
  - C Resource agency concerns for biological resources along the Gila River near the Safford Mining District;
  - C Federal Endangered Species Act compliance requirements; and
  - C The monitoring, evaluation, and mitigation requirements incorporated into the Mitigation and Monitoring Plan for the proposed Dos Pobres/San Juan Project, and mitigation and monitoring measures that would be required of future mining-related RFFAs.
- C **No Land Exchange Alternative.** Cumulative effects to surface water resources of the Gila River would be the same as those associated with the Proposed Action alternative presented in the Mine Plan Alternative Set.

< **Surface Water Quality**

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative effects to surface water resources in the Safford Valley.

Implementation of the RFFAs anticipated for the selected lands following an exchange will require authorization/approval under a variety of federal and state regulations. Under either federal or private land ownership, all mining operations must be conducted in compliance with the substantive federal and state laws that protect environmental quality, including the Clean Water Act and Arizona's Aquifer Protection Permit (APP) program under Arizona Revised Statutes Title 49 and Arizona Administrative Code Title 18.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to surface water quality.

- C **No Land Exchange Alternative.** Cumulative effects to surface water resources of the Gila River would be the same as those described for the Proposed Action alternative.

< **Waters of the United States**

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to waters of the United States. If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts identical in scope to those reported for the Proposed Action alternative.
- C **No Land Exchange Alternative.** Cumulative impacts to waters of the United States would be the same as those associated with the Proposed Action alternative.

**4.5.3.2.3 Biological Resources**

The discussions and analysis of cumulative impacts to biological resources are focused upon two distinct resources; Vegetation and Wildlife, and Threatened and Endangered Species and Designated or Proposed Critical Habitat.

< **Vegetation and Wildlife**

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to vegetation and wildlife resources in the Safford Valley. The land exchange would continue state-wide trends in federal land ownership that have placed valuable vegetation and wildlife resources (e.g., Tavasci Marsh and portions of Bonita Creek) or lands that improve manageability of public lands (e.g., lands adjacent to the Dos Cabeza Mountains Wilderness and lands within the Las Cienegas Resource Conservation Area) into public ownership.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts identical in scope to those described for the Proposed Action alternative.

- C **No Land Exchange Alternative.** Cumulative impacts to vegetation and wildlife resources would be the same as those associated with the Proposed Action alternative.

< **Threatened and Endangered Species and Designated or Proposed Critical Habitat**

- C **Land Exchange Alternative.** Land tenure adjustments associated with the proposed exchange, in and of themselves, will not result in adverse cumulative impacts to threatened and endangered species or proposed or designated critical habitat. Beneficial impacts are expected as a result of the land exchange. Bald eagle, American peregrine falcon, southwestern willow flycatcher, and lesser long-nosed bat are known to occur or are considered likely to occur on several of the offered land parcels (see section 4.4.3.3.2 for

additional discussion). Acquisition of the Tavaschi Marsh, Curtis, and Amado offered properties will cumulatively increase the acreage of designated critical habitat, for spikedace, loach minnow, Gila topminnow, and southwestern willow flycatcher under federal management, protection, and control.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE is not expected to result in cumulative adverse impacts to threatened and endangered species or proposed or designated critical habitat. This determination of cumulative effects is supported by the Biological Opinion issued by USFWS for the Project (USFWS 2002).

- C     **No Land Exchange Alternative.** Cumulative impacts to threatened and endangered species and designated or proposed critical habitat are not expected.

#### 4.5.3.2.4 Cultural Resources

- <     **Land Exchange Alternative.** The proposed land exchange *per se* would not contribute to the cumulative physical impact on cultural resources resulting from the activities listed in Table 4-38. The proposed land exchange would, however, contribute to the total number of cultural resources shifted from public ownership to private ownership and from private ownership to public ownership. Cultural resources removed from public ownership would no longer be subject to federal oversight and consideration under NHPA, AIRFA, NAGPRA, Executive Order 13007, and other federal laws and regulations unless proposed activities that would result in adverse impact to these resources required federal approval. Under current regulation, this applies to all but the smallest development activities. Mining, commercial, and industrial activities, most residential subdivisions and development projects, etc. all require federal approval and thus trigger the full protection of NHPA and other applicable federal regulations. Cultural resources that contain human remains and other funerary objects that occur on private lands would be subject to the protections of applicable state regulations. Cultural resources transferred to public ownership with federal management would be protected by a suite of applicable federal regulations.

Under the three proposed or approved land exchanges in the general region (Safford, ASARCO Ray, and Morenci) that are associated with proposed mining activities, a maximum of 143 archaeological sites would be transferred from public to private ownership. The majority of these sites are prehistoric and considered to be TCPs by at least one tribe consulted by federal agencies. In addition, several specific sites have been identified as being of traditional importance to one or more tribes and at least three sites have been determined to be sacred sites per Executive Order 13007.

Cultural resources on offered lands would also shift from private ownership to public ownership. Public acquisition of offered lands would result in additional cultural resources becoming subject to federal oversight and protection under NHPA, AIRFA, NAGPRA, Executive Order 13007, and other pertinent federal laws and regulations. The total number and type of sites in this category on the offered lands are unknown, therefore, the net impact on cultural resources from these exchanges cannot be quantified.

Foreseeable uses of the selected lands in these three land exchanges would result in the loss of and/or damage to a large portion of the cultural resources recorded in the project areas.<sup>51</sup> The total

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<sup>51</sup> Treatment plans as described under the Proposed Action Alternative in Section 4.5.3.1.4 have been or are currently being prepared for these sites.

number cultural resource sites within the selected lands is a small percentage of the recorded and unrecorded sites found within the geographic scope of the cumulative impacts assessment but the number is expected to be substantial. While the exact acreage of the lands within the geographic scope of the cumulative impact assessment that have been subjected to formal cultural resources investigation is unknown, it is not unreasonable to presume that the majority of this area has not been surveyed for cultural resources. For example, 3,984 archaeological sites are known in Pima County, a large county located west of the study area and containing similar landform and resource elements. Yet, only 12.1% of the lands within Pima County have ever been formally investigated for cultural resources (Sonoran Desert Conservation Plan Report -- Cultural and Historic Resources Element: Saving the Past for the Future, Pima County, August 2000).

Considering: 1) the land tenure adjustments outlined in Section 4.5.2.3 that have resulted in a net increase of more than 2.9 million acres in federal public land holdings in Arizona; and 2) the implementation of cultural resource regulations by federal, state, and local land jurisdictions, the loss of information and understanding that historically resulted from the unmitigated destruction of archaeological sites has been reduced significantly over the past several decades. The implementation of a state and federally approved data recovery program with extensive involvement and participation by interested Native American groups as a condition of the land exchange mitigates for potential adverse direct and indirect effects. The mitigation program minimizes the loss of information and data regarding the prehistory of the region, provides for the appropriate treatment of any human remains encountered, and provides for the preservation in place and access to sacred sites in a manner acceptable to consulted Native American groups. This further reduces potential cumulative adverse impacts of the proposed project. In this context, the implementation of the Land Exchange alternative is not expected to result in significant adverse cumulative impacts to cultural resources.

- < **No Land Exchange Alternative.** Cumulative effects of this alternative on cultural resources would be the same as those described under the Proposed Action alternative.

#### **4.5.3.2.5 Socioeconomic Resources**

- < **Land Exchange Alternative.** With the exception of increased property taxes that result from privatization of the selected lands, there are no anticipated cumulative effects within the Safford Area beyond those anticipated for the Proposed Action and Partial Backfill alternatives. Reductions in the property tax payments associated with the federalization of offered lands will be offset to a degree by Payments in Lieu of Taxes (PILT) from the federal government to the counties in which the offered lands are located. As all of these properties are assessed as rural/agricultural/vacant lands, one of the lowest tax categories, none of the counties are expected to be significantly affected by lost tax revenues.

If the BLM selects the Land Exchange alternative, permitting of either the Proposed Action or the Partial Backfill alternative by the COE will result in cumulative adverse impacts similar in scope to those reported for the Proposed Action alternative.

- < **No Land Exchange Alternative.** Cumulative effects of the No Land Exchange alternative would be the same as those of the Proposed Action alternative.

#### 4.5.3.2.6 Indian Trust Resources

- < **Land Exchange Alternative.** The land exchange, in and of itself, will not result in any adverse impacts to Indian trust assets. Permitting of currently proposed mine activities by the COE on the selected lands will require implementation of the substantive requirements of the Mitigation and Monitoring Plan that will be made a part of any Corps permit issued for the proposed Dos Pobres/ San Juan Project. Further, we anticipate that similar requirements will exist for future foreseeable mining activities on the selected lands.
- < **No Land Exchange Alternative.** Cumulative effects of the No Land Exchange alternative would be the same as those of the Proposed Action alternative.

## 4.6 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF PUBLIC RESOURCES

This section identifies irretrievable or irreversible commitments of public resources that would likely occur with each of the alternatives. An irretrievable commitment of a resource occurs when the use or productivity of a renewable resource is lost over a limited period of time; for example, grazing suspended in an area during mining activity but resumed through post-mining land uses as rangeland. In this example, the grazing productivity during the period of suspension is irretrievably lost. An irreversible commitment occurs when a nonrenewable resource is permanently lost; for example, the extinction of a species. This analysis of irretrievable or irreversible commitments of public resources is provided in a comparative tabular format for both the Mine Plan Alternatives Set and the Land Exchange Alternatives Set and follows the general organization of resource categories used throughout this document.

### 4.6.1 Mine Plan Alternatives Set

#### 4.6.1.1 Proposed Action Alternative

Table 4-44 summarizes the irretrievable and irreversible commitments of resources resulting from implementation of the Proposed Action alternative.

#### 4.6.1.2 Partial Backfill Alternative

The Partial Backfill alternative would result in irretrievable and irreversible commitments of resources identical to those described for the Proposed Action alternative. The specific nature of these impacts is discussed in detail in earlier sections of this chapter and in Table 4-44.

#### 4.6.1.3 No Action Alternative

This alternative would not irretrievably or irreversibly commit resources of public lands or federal agencies.

### 4.6.2 Land Exchange Alternatives Set

#### 4.6.2.1 Land Exchange Alternative

The Land Exchange alternative itself would be an irretrievable and irreversible commitment of public selected lands and their resources. The specific nature of these impacts on land use, and physical, biological, cultural,

Table 4-44. Irretrievable and Irreversible Commitments of Public Resources Associated with the Proposed Action Alternative

Major Category	Subcategory	Irretrievable Commitments of Resources	Irreversible Commitments of Resources
<b>Land Use</b>	Access/ Recreation	None	Loss of public access on the San Juan Mine Road; loss of dispersed recreation (hunting, recreational driving) on public lands at mine site; mitigated by upgrading an existing alternate route to public recreation areas
	Grazing	Loss of grazing on 3,238 acres of public lands removed from BLM grazing allotments during life of Project but would be returned to allotments after mine closure	Permanent loss of 1,931 acres of public lands in BLM grazing allotments due to surface disturbance by mining activity
	Noise and Vibrations	Loss of quiet for short periods daily in Safford area during life of Project due to noise and low-level vibrations from mine blasting	None
	Visual Resources	None	Modification of natural forms, colors, textures, and structures of the landscape of mine site as seen from the Safford area
<b>Physical Resources</b>	Climate	None	On very localized scale, minor changes in wind patterns on mine site resulting from topographical changes from mining facilities
	Air Quality	Reduced air quality in project area during life of Project due to increased emissions for some criteria pollutants (but no standards are predicted to be exceeded)	None
	Geology (Mineral Potential)	None	Loss through extraction of most known metallic mineral resources and some aggregates on lands in project area
	Soils	Loss of productivity of stockpiled project area soils (all poor quality) until used for concurrent and post-mine reclamation efforts	Loss of soils (all poor quality) from public lands removed or covered during mine development but not stockpiled for reclamation purposes
	Groundwater Quantity	Nearly zero decline in groundwater table elevation due to pumping at Project; commitment of resource reversible but not in a human time frame (>3,000 yrs); physical effects on Gila River flows mitigated	None

Table 4-44, continued. Irretrievable and Irreversible Commitments of Public Resources Associated with the Proposed Action Alternative

Major Category	Subcategory	Irretrievable Commitments of Resources	Irreversible Commitments of Resources
<b>Biological Resources</b>	Surface Water Quantity	Reduced water flow (94 af/yr average) in some washes due to stormwater diversions on the mine site; although this commitment of resource is reversible, since the Project is a zero-discharge facility it is essentially irretrievable for the foreseeable future; physical effects on Gila River flows would be mitigated in perpetuity	Loss of washes and associated surface water flow due to fill and excavation activity during mine development; loss of DP seep; physical effects on Gila River flow mitigated
	Waters of the U.S.	Same as above; 93.2 acres of jurisdictional waters affected during mining operations	Same as above; 21.4 acres of jurisdictional waters lost due to mine facilities
	Vegetation	Loss of productivity of an unquantified amount of Sonoran Desertscrub, Sonoran Desertscrub/ semidesert Grassland Ecotone, and Xeroriparian vegetation on parts of mine site slated for reclamation until those areas are revegetated as a result of human effort or natural processes	Loss of an unquantified amount of Sonoran Desertscrub, Sonoran Desertscrub/semidesert Grassland Ecotone, and Xeroriparian vegetation from unreclaimed areas of mine site (pits).
	Wildlife	Reduced wildlife presence in project area due to lost habitat as described above and from noise, nighttime lighting, and other human activity during life of Project	Reduced wildlife presence due to lost habitat as described above or destruction of wildlife, particularly small animals like invertebrates, reptiles, or rodents, due to construction and mining activity
	Special Interest Species	None	Due to surface disturbance by mining activity, loss of mine features potentially used by special status bats, loss of population of Pima Indian mallow, and loss of some Gila monster habitat and individuals
<b>Cultural Resources</b>	Archaeological Sites	None	Loss of 13 archaeological sites on public lands and 24 on PD land due to surface disturbance by mining activity; potential loss of scientific information about history/prehistory may be offset by archaeological data recovery and analysis
	Traditional Cultural Properties	None	Loss of 10 sites on public lands and 16 sites on PD land identified as TCPs by Indian tribes; tribal access to some sacred sites during and after operations prevents irreversible impacts
<b>Indian Trust Resources</b>	Indian Trust Assets	Unmeasurable but predicted temporary impact to groundwater flow under the San Carlos Apache Reservation (very small increase in rate of flow off the Reservation). The current model predicts a nearly zero decline of the groundwater table elevation, which could be confirmed or revised by future model recalibration(s).	None

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socioeconomic, and Indian trust resources is discussed in detail in earlier sections of this chapter, along with discussion of proposed mitigation for adverse impacts. There would also be an irretrievable loss of BLM authority for management of the public resources on the selected lands; however, federal oversight for future land uses on the selected lands as private lands is required for activities subject to compliance with the CWA, the Clean Air Act, and other federal laws and regulations.

While acquisition of the offered lands is not mitigation, *per se*, for loss of the selected lands, the resources of the lands acquired by the public are meant to provide public benefit and value equal to or beyond those values associated with the selected lands.

The foreseeable uses of the selected lands would have irretrievable and irreversible commitments of resources described in part in Section 4.6.1.1 above. Additional irretrievable commitments of resources similar to these would be expected if the foreseeable uses at Dos Pobres sulfide and Lone Star were implemented in the future.

### 4.6.2.2 No Land Exchange Alternative

This alternative would not, in and of itself, irretrievably or irreversibly commit any resources associated with the selected or offered lands. It would commit BLM personnel to subsequently make a decision regarding the one of the mine plan alternatives, and given the regulations at 43 CFR § 3809, it is likely that a mine plan alternative would be authorized

## 4.7 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

This section identifies the impacts to long-term productivity of resources resulting from the short-term uses proposed by the alternatives in both the Mine Plan Alternatives Set and the Land Exchange Alternatives Set. Long-term productivity refers to the ability for continued production or sustained yield of a resource ( i.e., the productivity of renewable resources). Short-term uses include activities such as mineral extraction, timber and fuelwood harvesting, recreation uses, livestock grazing, and special land uses. The analysis is focused on impacts of the alternatives on renewable resources, such as soils, vegetation, and surface water and groundwater quantity and quality, upon which productivity is generally based.

### 4.7.1 Mine Plan Alternatives Set

#### 4.7.1.1 Proposed Action Alternative

The mineral extraction activities proposed in this alternative would affect the long-term productivity of some soils, vegetation, and both surface and groundwater resources on the public lands proposed for mining. The long-term productivity of most soils and vegetation resources in the proposed mining areas would be permanently lost through surface disturbance, burial under stockpiles or leach pad, or other construction. These impacts would subsequently have long-term but localized adverse impacts on other resources, such as wildlife and wildlife habitat, grazing capacity, some dispersed recreational opportunities, and on public access within those disturbed areas. Reclamation measures, such as revegetation and removal of structures and roads, would mitigate this loss of soil and vegetation productivity to some degree.

Impacts to the long-term productivity of surface and groundwater quantity are evidenced by the anticipated long-term by slight lowering of groundwater elevations in the region of the Project. While the consequent



impacts of this on surface water quantity in the Gila River can and would be mitigated (see Appendix F), this long-term change in groundwater gradients in the project area resulting from the cone of depression and mine pits is nearly zero and would not potentially affect the long-term yield and availability or, or access to, groundwater to current and future users of this resource, including residents of the San Carlos Apache Reservation (the current model predicts an impact to water table elevation of nearly zero, a prediction that could be confirmed or revised by future model recalibrations).

Impacts to the long-term productivity of surface and groundwater quality have been minimized through a variety of environmental protection measures, such as the use of liner systems; secondary containment systems; stormwater diversions and detention and retention basins; application of BADCT criteria for design, construction, and operation of potentially discharging facilities; and operation of the Project as a non-discharge facility under Section 402 of the CWA. Thus, the current quality of the surface and groundwater resources is expected to be maintained and with it its long-term productivity as a renewable resource.

#### **4.7.1.2 Partial Backfill Alternative**

This alternative would be expected to result in identical impacts to long-term productivity of soil, vegetation, and water resources as the Proposed Action alternative.

#### **4.7.1.3 No Action Alternative**

This alternative would have no impact on the long-term productivity of soils, vegetation, and water resources.

### **4.7.2 Land Exchange Alternatives Set**

#### **4.7.2.1 Land Exchange Alternative**

In a strict sense, a land exchange alternative does not involve any “short-term uses” of resources; public lands would be placed permanently into private ownership. As such, this alternative, which is a realty action, would not affect the long-term productivity of soil, vegetation, or water resources of the selected lands. However, foreseeable uses of the selected lands (mining) would result in the same impacts to long-term productivity as those described for the Proposed Action alternative and would also include similar impacts to productivity of resources on the Dos Pobres sulfide and Lone Star areas of the selected lands that would occur later in time. The long-term productivity of renewable resources acquired on the offered lands would benefit from this alternative, as BLM’s “management [of public lands] is based upon the principles of multiple use and sustained yield...” (see inside front cover for BLM and Safford Field Office’s mission statements).

#### **4.7.2.2 No Land Exchange Alternative**

This alternative, in and of itself, would have no impacts on the long-term productivity of resources on federal lands. However, since mining is the reasonably foreseeable use of the selected lands given the BLM’s subsequent requirement to select a mine plan alternative if this alternative is chosen, the impacts to long-term productivity would be identical to those described in Section 4.7.1. The long-term productivity of the offered lands would be subject to private management by PDSI.

## 4.8 UNAVOIDABLE ADVERSE IMPACTS

Unavoidable impacts are those impacts that remain following the implementation of all applicable mitigation measures. This section describes the impacts resulting from the Project or its alternatives that are both unavoidable and adverse.

### 4.8.1 Mine Plan Alternatives Set

#### 4.8.1.1 Proposed Action Alternative

Because of mitigation measures developed as part of the NEPA planning process and in compliance with BLM guidance and the COE's CWA Section 404 permitting requirements (e.g., the Mitigation and Monitoring Plan), unavoidable adverse impacts of the alternatives presented in this EIS would be limited to the following:

- < temporary loss of grazing on 3,238 acres of public lands, and permanent loss of 1,931 acres of grazing on public lands;
- < major permanent modifications to the landscape (e.g., development rock stockpiles, leach pad, pit lakes) whose visual impacts have been reduced to some degree by mitigation measures but not entirely;
- < increased noise and vibrations resulting from mine blasting during the 16-year life of the Project;
- < permanent loss of DP seep; and
- < destruction of 37 archaeological sites, 26 of which are considered to be traditional cultural properties by Indian tribes. The potential loss of scientific information associated with these sites would be mitigated by archaeological investigations, however, some tribes such as the Hopi and the San Carlos Apache, consider destruction of sites to be an unmitigable effect on cultural resources.

#### 4.8.1.2 Partial Backfill Alternative

This alternative would have the same unavoidable impacts as those described for the Proposed Action alternative.

#### 4.8.1.3 No Action Alternative

This alternative would have no unavoidable adverse impacts.

### 4.8.2 Land Exchange Alternatives Set

#### 4.8.2.1 Land Exchange Alternative

The land exchange itself would have no unavoidable adverse impacts; foreseeable uses of the selected lands would result in the same unavoidable adverse impacts to resources as those described for the Proposed Action alternative.

#### **4.8.2.2 No Land Exchange Alternative**

This alternative, in and of itself, would have no unavoidable adverse impacts. However, the unavoidable adverse impacts associated with the Proposed Action alternative would be presumed to occur, given the BLM's requirement to make a subsequent decision regarding a mine plan alternative if this alternative is selected.

### **4.9 MITIGATION**

This section summarizes the proposed mitigation measures for direct and indirect impacts resulting from the action alternatives considered in this document (Table 4-45). Detailed mitigation and monitoring measures for impacts to waters of the U.S. and other water resources are provided in Appendix F.

Table 4-45. Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
LAND USE				
Public Lands Management	Loss of BLM jurisdiction over selected lands, including for mine reclamation.	N/A	Same as for Proposed Action.	No mitigation required. Other federal agency jurisdiction still applicable (e.g., COE). PDSI's Reclamation Plan meets both federal and state requirements and APP monitoring and closure requirements would still apply, so no adverse impact from loss of BLM oversight.
Access and Recreation	Loss of public access on San Juan Mine Road to Gila Mountains.	Although alternate access to the Gila Mountains is still available, PDSI will upgrade portions of the existing Solomon Pass Road to accommodate fair-weather travel of 2-wheel-drive passenger vehicles as mitigation. Other mitigation measures for this impact include BLM retaining easements on portions of West Ranch and Salt Trap Tank roads to provide continued access to the Gila Mountains and Gila Box RNCA.	Same as for Proposed Action.	Same as for Proposed Action.
	Loss of dispersed recreational opportunities on public lands.	PDSI would provide 'scenic overview' opportunities as part of educational/tourism post-mining land uses. No other specific mitigation is proposed.	Same as for Proposed Action.	Recreational opportunities gained on offered lands compensate for this impact.
	Impact to part of route for Johnny Creek Ride through public lands	No mitigation proposed; BLM may continue to issue Special Use Permit to event organizers if an alternate route on public lands is proposed.	Same as for Proposed Action.	Same as for Proposed Action.
Grazing	Reduced stocking capacity and loss of use of range improvements, including those for stock/wildlife watering, within proposed security fence.	Mitigation (i.e., payment) would be made to the appropriate party(s) for the eight registered range improvements directly impacted by the proposed mining operations (i.e., those improvements located within the proposed security/grazing fence). No mitigation for reduced allotment stocking capacity. Mitigation for loss of range improvements for stock/wildlife would be provisions for replacement water features if possible.	Same as for Proposed Action.	Same as for Proposed Action.
Visual Resources	Major modifications to the landscape in the Safford Valley; increased nighttime lighting effects.	Mitigation for visual impacts include revegetation of portions of development rock stockpiles as described in Reclamation Plan (PDSI 2003), as well as the following measures: 1) use earth-toned paint colors for buildings to reduce their visibility; 2) recontour the land disturbed for road cuts and fills, stormwater diversions, impoundment dams, borrow areas, stockpiles, and other facilities; and 3) recontour the sharp angles of the corners and edges of the front, sides, and tops of the pad and stockpiles as described in Reclamation Plan to reflect the natural, adjacent landforms. Nighttime lighting effects will be minimized through compliance with Graham County Nighttime Lighting Ordinance (shielding, use of sodium lighting, etc.); use of conveyors will minimize haul truck usage thereby reducing need for portable light plants at the leach pad and effects from truck headlights.	Same as for Proposed Action.	N/A
Hazardous Materials	Risk of contamination by hazardous materials through spills.	To minimize risks associated with use and transport of hazardous materials, all such materials would be transported, handled, stored, and disposed of per requirements of MSHA, RCRA, and CERCLA (see Sections 2.1.2.3.5 to 2.1.2.3.8). The shipping company selected by PDSI to transport hazardous materials would be required to comply with applicable federal and state regulations governing such transport, and implement additional safety and truck design measures as discussed in General Response No. 14. PDSI would develop a Spill Prevention Control and Countermeasures (SPCC) Plan to address requirements for preventing accidental spills and developing procedures to be followed in the event of a spill. Upon closure of the mines, PDSI would be required to properly remove and dispose of hazardous materials from the mine sites per APP and reclamation requirements.	Same as for Proposed Action.	N/A

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
PHYSICAL RESOURCES				
Air Quality	Some decrease in ambient air quality but within federal and state standards due to implementation of environmental protection measures.	Environmental protection measures incorporated into the MPO include dust control at crushing and screening facilities and at ore surge piles consisting of fog nozzles and water-wetting systems to suppress dust, and air pulse dust collection systems to filter dust-laden air. Water trucks would systematically suppress dust on roads. Methods being evaluated by PDSI to control sulfuric acid mist in the tankhouse include heat retention beads and balls, surfactants, water foggers, and cell wipers. Emissions of VOCs during the solution extraction process would be minimized through engineering design and diluent selection for low vapor pressure. Boiler combustion gasses would be minimized through use of clean-burning fuels, such as propane and/or natural gas.	Same as for Proposed Action.	N/A
Soils	Direct, long-term impacts to soil productivity.	Mitigation includes stormwater control measures to limit erosion potential, watering during construction and operations to control soil loss by wind erosion, stockpiling soils for reclamation, revegetation programs, and contouring sides and tops of stockpiles to reduce wind and water erosion effects.	Same as for Proposed Action.	N/A
Groundwater Quantity	Pumping causes lowered groundwater surface elevation in project area vicinity (cone of depression); 1' drawdown contour does not reach Reservation, Bonita Creek, or Gila River; predicted wellhead pressure reduced by 0.72 ft at Watson Wash; Dos Pobres and San Juan pit lake evaporation estimated at 21 af/yr in perpetuity	No direct mitigation for predicted cone of depression is proposed, however, reduced tributary groundwater is predicted to affect surface water flows and associated legally protected resources such as jurisdictional waters of the U.S., habitat for listed species, designated critical habitat, and/or Indian trust assets (surface water rights and reservation groundwater). To mitigate for subsequent predicted physical effects on surface flows (total predicted maximum of 149 af/yr, including pit lake evaporation), 3M Program will be implemented (see also Mitigation under Surface Water Quantity). Program involves monitoring groundwater levels and using actual well data to recalibrate the predictive groundwater model; if necessary, adjust acres of fallowed lands in Alternate Year Following Program to reduce consumptive use of river flow to offset predicted effects from pumping. Flows at the Watson Wash artesian well would also be monitored and height of discharge pipe lowered if necessary to offset reduced groundwater flow. (See appropriate sections of this table and Appendix F for specifics.)	Same as for Proposed Action.	N/A
Groundwater Quality	No impacts expected due to implementation of environmental protection measures required by ADEQ's APP Program. Risk of discharge to groundwater would be reduced by these measures but cannot be eliminated.	Environmental protection measures incorporated into the MPO include BADCT applications such as liner system for the leach pad, use of PLS excess solution pond and stormwater impoundment; a stormwater impoundment conservatively sized for a 100-year/24-hour storm event combined with 24-hour power outage; and double containment systems for the SX/EW tankhouse facilities. Groundwater quality would be monitored systematically for APP compliance and also for 3M Program (Appendix F). APP closure requirements include permanent strategies to control run-on, runoff, and infiltration.	Same as for Proposed Action.	N/A
Surface Water Quantity	Model-predicted reduction (unmeasurable) in surface water flows in the Gila River; total maximum peak impact is 149 af/yr at Year 450 after mining starts. Bonita Creek flows reduction also unmeasurable.	Alternate Year Fallowing of decreed farmland that PDSI owns in the Safford Valley would offset predicted impacts to surface water flows in the Gila River by reducing consumptive use for agriculture. The net effect of the Alternate Year Fallowing Program (see Appendix F) would be to leave water in the river that otherwise would have been diverted for irrigation. The program calls for fallowing 200 acres each year in an alternating pattern. Based on recent per-acre consumptive use in the Safford Valley, fallowing 200 acres would reduce consumptive use by 480 af/yr of water in the Gila River that would otherwise be diverted. Because 480 af/yr is more than three times the total maximum predicted impact on Gila River flows (149 af/yr), the program as currently configured will be more than adequate even if the monitoring program and future model recalibration predicts a higher impact. Should revised estimates exceed 480 af/yr, additional decreed farmland is available to be fallowed to make up the difference. The Alternate Year Fallowing Program would be implemented in perpetuity and protected by placing deed restrictions on the decreed lands incorporated into the program.	Same as for Proposed Action.	N/A
	Model-predicted reduction in surface water flow at the Watson Wash artesian well.	Predicted 0.72 ft reduction in wellhead pressure would be mitigated by lowering the height of the well discharge pipe by the appropriate amount to maintain surface flows at the current volume.	Same as for Proposed Action.	N/A
	Placement of fill into waters of the U.S. from mining activities.	To reduce temporal impacts associated with loss of riparian functions of 68 acres of WUS on the project site, proposed mitigation measures (creation, enhancement, and preservation of riparian and wetland habitats) have already been implemented at the Pima and Thatcher mitigation sites as described in Appendix F. Habitat mitigation objectives include creation of 30 acres of riparian habitat, enhancement of 18 acres of riparian and wetland habitat; and preservation of 160 acres of riparian habitats along the Gila River in the Safford Valley.	Same as for Proposed Action.	N/A

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
PHYSICAL RESOURCES (continued)				
Surface Water Quality	No impacts expected due to implementation of environmental protection measures required by CWA Sections 404, 402 (AZPDES permit), and 401 (state water quality certification).	Environmental protection measures incorporated into the MPO include designing and operating the Project as a non-discharge facility (per Section 402 of the CWA), i.e., using BADCT criteria for the design, construction, and operation of all potentially discharging facilities such as the leach pad and stormwater management system. The stormwater management system has been conservatively sized for a 100-year, 24-hour storm event combined with a 24-hour power outage (a very unlikely and extreme scenario). PD will prepare and comply with a Stormwater Pollution Prevention Plan that stipulates Best Management Practices to be implemented to minimize surface water quality impacts during mine construction.	Same as for Proposed Action.	N/A
BIOLOGICAL RESOURCES				
Vegetation	Loss of upland habitat (grubbing) and xeroriparian habitat (scouring, dewatering).	Air quality permit requirements and reclamation measures to restore vegetation on some facilities (including on soil stockpiles for dust control) would help to mitigate for these impacts. As described above, COE requires mitigation for indirect impacts to riparian habitat resulting from permitted impacts to waters of the U.S.	Same as for Proposed Action	N/A
Special Interest Species	Potential impacts to habitats and designated critical habitat for special interest species from construction, mining operations, and groundwater pumping.	Potential impacts to Gila topminnow (if present) due to predicted reduced wellhead pressure (i.e., reduced flow) at the Watson Wash artesian well would be mitigated by lowering the well discharge pipe height by the same amount (Appendix F). Alternate Year Fallowing Program (Appendix F) will reduce any potential for indirect impacts to critical habitat or to listed species, such as southwestern willow flycatcher, that are known to occur along the Gila River. Prior to mine construction, caves and other mine features will be examined for bat use, vacated in an appropriate manner, and closed. Biological Opinion issued by FWS considered the proposed fallowing and habitat mitigation measures as described in Appendix F and concurred with BLM's and COE's determination that the Project and these measures were unlikely to adversely affect listed species or critical habitat.	Same as for Proposed Action	N/A
Wildlife	Loss of wildlife habitat and small wildlife (rodents, reptiles, insects, etc.) during mine and road construction. Potential adverse impacts to wildlife through exposure to PLS pond.	PDSI will monitor potential wildlife use of the excess process solution impoundment for one year. Should monitoring results indicate that significant adverse impacts are occurring to wildlife, appropriate mitigation measures would be implemented. Security fencing around active mine area will help reduce adverse impacts to larger wildlife.	Same as for Proposed Action	N/A
CULTURAL RESOURCES				
Archaeological Sites and TCPs	Destruction of 13 archaeological sites on public lands and 24 sites on private lands. Loss of 26 sites identified as TCPs by Indian tribes: 10 on public lands and 16 on private lands.	A treatment plan has been developed to address impacts on cultural resources (SWCA 2003b). Some archaeological sites may be avoided by judicious placement of certain mine facilities, such as access roads, transmission line poles, etc. Mitigation for sites that cannot be avoided consists of implementing a BLM-approved and SHPO-reviewed testing and data recovery plan that was developed with input from Indian tribes that have consulted with BLM for this project. The purpose of testing and data recovery (which itself destroys a site) is to gather as much scientific information as possible from the sites before they are physically impacted by the Project. Twenty-six of the thirty-four affected archaeological sites have been identified as traditional cultural properties by one or more Indian tribes. In the case of sacred sites, provisions have been made for avoidance/protection of three sacred traditional cultural places. PDSI has agreed to provide access to two of these sites to tribes under either the land exchange alternative or the MPO alternative. Relocation of eight boulders bearing petroglyphs that would otherwise be impacted by mining has been recommended and is included in the treatment plan. BLM recognizes that certain tribes feel that some kinds of direct and indirect impacts on cultural resources cannot be mitigated.	Same as for Proposed Action.	N/A
	Loss of BLM (federal) jurisdiction over 115 archaeological sites on the selected lands, including 76 sites identified as TCPs by Indian tribes. Four of the 76 sites were also identified as sacred places.	N/A	N/A	To mitigate for the loss of federal oversight and protection, the testing and data recovery plan approved by BLM and reviewed by SHPO for sites on the selected and private lands to be impacted by the foreseeable mining uses would be implemented prior to the exchange of title for the selected lands. BLM recognizes that certain tribes feel that some kinds of direct and indirect impacts to cultural resources cannot be mitigated.

Table 4-45 (continued). Proposed Mitigation Measures for Impacts of Action Alternatives for the Dos Pobres/San Juan Project (N/A = mitigation not applicable since this alternative would not cause a measurable impact)

IMPACTS		PROPOSED MITIGATION MEASURES		
Subcategory	Issue/Impact	Mine Plan Alternatives Set		Land Exchange Alternatives Set
		Proposed Action Alternative	Partial Backfill of San Juan Alternative	Land Exchange Alternative*
SOCIOECONOMIC RESOURCES				
Taxes	Net loss of private property tax income to Pima, Santa Cruz, and Yavapai Counties (Net gain for Graham and Cochise Counties).	N/A	N/A	This impact would be offset partly through Payments in Lieu of Taxes (PILT) from the federal government to counties for federal land holdings; no other mitigation is proposed or required.
Transportation	Degraded pavement and increased vehicle and truck traffic on parts of Safford-Bryce Road.	The Proposed Project would result in substantial payments by PDSI in state and local taxes that fund road repair and other improvements. No mitigation is proposed or necessary	Same as for Proposed Action.	N/A
INDIAN TRUST RESOURCES				
Indian Trust Assets	Reduced tributary surface and groundwater flow to the Gila River resulting from pumping may have potential adverse impacts to Indian holders of priority water rights on the Gila River.	Implementation of the fallowing program for model-predicted reductions in surface water flows in the Gila River from groundwater pumping and surface water diversion would eliminate the potential for adverse impacts to holders of priority water rights on the Gila River, such as the Gila River Indian Community and the San Carlos Apache Tribe.	Same as for Proposed Action.	N/A
	Model-predicted decline in groundwater elevation under San Carlos Apache Reservation is nearly zero and unmeasurable; very slight predicted temporary increase in flow of groundwater off Reservation	N/A	Same as for Proposed Action.	N/A

\* This column applies only to the proposed land exchange *per se*; foreseeable uses of the selected lands are not included. Mitigation for impacts attributable to foreseeable uses associated with the Dos Pobres/San Juan Project is described under "Proposed Action." Any mitigation for impacts attributable to foreseeable uses associated with development of the Dos Pobres sulfide and Lone Star deposits would be determined at the time of federal permitting for those potential future projects.

# CHAPTER 5

## CONSULTATION AND COORDINATION

The project team's efforts to consult and coordinate with potentially interested and affected publics was continuous throughout the NEPA process, but specifically included two separate scoping periods. An initial scoping was conducted from November 1994 through January 1995 when the proposed action was solely a BLM land exchange; a second scoping effort was conducted with COE and EPA as cooperators in August-October 1996 after PD submitted the Dos Pobres/San Juan Plan of Operations. During both scoping efforts, input was solicited and received from federal, state, and local agencies; elected representatives; tribal officials; non-governmental organizations; and private individuals. In addition, the BLM consulted with Native American tribes and with the Office of American Indian Trust (OAIT) regarding potential impacts to Indian trust assets. This chapter summarizes efforts to notify and involve potentially interested or affected parties in the proposed Project.

### 5.1 PUBLIC PARTICIPATION AND SCOPING

The initial Public Participation Plan (PPP) for the Project was approved on October 25, 1994, by the BLM's State Director as part of the BLM's EIS Preparation Plan for the Safford Land Exchange. A revised PPP was approved on July 23, 1996, as part of the BLM's EIS Preparation Plan for the Dos Pobres/San Juan Project. The objective of both PPPs was to identify the efforts to be used to notify potentially interested parties of the proposed Project and provide opportunities for public involvement in the environmental analysis process. The primary public scoping elements of both PPPs are described below.

#### 5.1.1 Publication of a Notice of Intent (NOI)

Two formal Notices of Intent (NOIs) to Prepare an EIS were published in the *Federal Register* for this Project. The first NOI was published on November 3, 1994; the second, on July 31, 1996. Both NOIs briefly described the proposed action, provided 30-day advance notice of scheduled public meetings in which public comments on the Project were being solicited, indicated the closing date for receipt of scoping comments, and provided a contact name and telephone number for those wanting more information or wishing to submit comments to the BLM's Safford Field Office.

#### 5.1.2 News Release

For the first scoping effort, a news release was sent in November 1994 to media within the state, and an informational letter was mailed to approximately 1,400 persons, groups, agencies, tribes, and congressional offices potentially interested in the proposed land exchange. The mailing list was developed from a master list maintained by the Safford Field Office and supplemented with names of owners of properties adjacent to the selected and offered lands. A second news release notifying the public of the change in scope of the proposed action was mailed in August and September 1996. The second mailing list included the initial list plus the media and COE's Phoenix Branch mailing list.



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In addition to describing the proposed Project and extending a general invitation to the public to attend scheduled open-house public meetings, each news release gave the closing date for the scoping comment period (January 17, 1995, and October 12, 1996, respectively, for the initial and rescoping periods).

Table 5-1. Federal, State, and Local Agencies Contacted for this Project

Federal	State	Local
U.S. Army Corps of Engineers Los Angeles District, Regulatory Branch (Cooperating Agency)	Arizona Department of Agriculture	Graham County Planning and Zoning Department
Environmental Protection Agency Region IX (Cooperating Agency)	Arizona Department of Environmental Quality	Graham County Sheriff's Department
Bureau of Indian Affairs Phoenix Area Office	State Historic Preservation Office	
U.S. Fish and Wildlife Service (Phoenix and Tucson Offices)	Arizona Department of Water Resources	
National Park Service Tuzigoot National Monument	State Mine Inspector's Office	
Natural Resources Conservation Service (Safford)	Arizona Geological Survey	
Bureau of Reclamation Lower Colorado Regional Office	Arizona State Land Department	
U.S.D.A. Forest Service (Coronado National Forest and Apache- Sitgreaves National Forests)	Arizona Department of Mines and Mineral Resources	
U.S. Geological Survey	Arizona Department of Transportation	
U.S.D.I. Office of American Indian Trust	Arizona Game and Fish Department	
	Arizona State Parks Department	

### 5.1.3 Agency Coordination

In November 1994 and in early September 1996, letters were sent to the state and federal agencies listed in Table 5-1 describing the Project and requesting their relevant comments.

BLM's efforts to coordinate with Indian tribes and the Office of American Indian Trust (OAIT) regarding Indian trust assets are expected to continue until the ROD is issued (see Section 5.1.6). Formal Section 7 Consultation with the U.S. Fish and Wildlife Service regarding potential impacts to threatened and endangered species resulted in issuance of FWS' Biological Opinion on June 11, 2002, regarding the potential impacts of the Project on listed species and critical habitat; consultation will be reinitiated if new species are listed prior to issuance of the ROD. At the request of the Deputy Secretary of the Interior, the U.S. Geological Survey provided technical expertise to the BLM in resolving issues raised regarding the modeling effort, impact assessment, and potential monitoring and mitigation measures for predicted effects on water resources.

#### **5.1.4 Public Scoping/Open House and Tribal Information Meetings**

During the initial public scoping, in 1994, four open-house public meetings were held in Arizona, one each in Safford, Clifton, Phoenix, and Tucson on December 6, 7, 13, and 15, respectively, to inform the public about the Project and solicit comments. During the second scoping, in 1996, three public open-house meetings were held, one each in Safford, Tucson, and Phoenix on September 5, 10, and 11, respectively. Each meeting lasted four hours to provide adequate opportunities for the public to attend and receive information about the Project. Open-house meetings were advertised through publication of the NOIs in the *Federal Register*, legal notices in local papers, the aforementioned mailers to potentially interested parties, news releases to media, and radio announcements in the Safford-Clifton area.

For both sets of meetings, participants were asked to sign in and were provided with a Project information sheet and comment form. The information sheets briefly described the Project, identified the lead agency and the Project proponent, and included a statement written in Spanish indicating that information about the Project was available in the Spanish language through the BLM contact person. A total of 141 and 183 individuals attended the initial and second scoping meetings, respectively.

Additionally, presentations were made in September and October 1994 to the Land and Water Resources Committee of the Gila River Indian Community and to the San Carlos Apache Tribal Council to inform these tribes of the Project and to determine whether each tribe wanted public meetings held on their respective reservations. Both tribes independently requested informational presentations rather than public meetings. Twenty-two tribal representatives from the San Carlos Apache Tribe and seven from the Gila River Indian Community attended presentations made on December 7 and 13, 1994, respectively, at each reservation. Attendees were asked to sign in and were given the information sheet and comment form provided at the public scoping meetings.

During the rescoping, in September 1996, the BLM sent letters to the San Carlos Apache Tribe, White Mountain Apache Tribe, Gila River Indian Community, Ak-Chin Indian Community, Salt River Pima-Maricopa Indian Community, Tohono O'odham Nation, Hopi Tribe, and Zuni Pueblo, asking if these tribes had any interest in, and wished to consult on, the Project. The BLM also offered to give presentations about the Project to tribal representatives. By January 17, 1997, four tribes had responded with requests for presentations (the Gila River Indian Community, Ak-chin Indian Community, Salt River Pima-Maricopa Indian Community, and Tohono O'odham Nation). On December 20, 1996, the BLM presented information about the project to representatives of these tribes. The BLM also contacted the Navajo Nation, Mescalero Apache Tribe, and Fort Sill Apache Tribe to ask if they had concerns or wished to consult on the Project. Based on tribal responses, the BLM and third-party consultant SWCA Inc. consulted with all eleven tribes through meetings, telephone calls, and field trips to the Project area. Consultations were conducted primarily with tribal staffs and elders and focused on identification of and resolution of impacts to traditional cultural properties, Indian trust resources, and other Native American values. Potential impacts to these resources were discussed and avoidance/mitigation recommendations were provided by the consulting tribes.

#### **5.1.5 Public Outreach Activities**

For the initial scoping in 1994, the BLM developed a public affairs plan for the Project and undertook public outreach efforts that involved appearances by BLM personnel on local radio talk shows, announcements on local radio, and presentations to civic organizations. These public outreach activities extended beyond the initial 30-day comment period.

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For the rescoping effort, public outreach was limited to efforts by the Safford Field Manager and Area Manager to inform local community leaders of the changes to the Project through a community forum.

BLM managers provided updates to member of Arizona's congressional delegation and their staff throughout the development of the EIS. This was done at meetings in Safford, visits to congressional offices in Tucson, and quarterly congressional briefings at the BLM Arizona State Office in Phoenix.

### **5.1.6 Consultations for Potential Impacts to Indian Trust Assets**

#### **5.1.6.1 Tribal Consultation**

After withdrawal of the BIA as a cooperator in June 2000, BLM reinitiated consultations directly with the Gila River Indian Community and with the designated agent of the San Carlos Apache Tribe regarding the predicted impacts of the project on surface flows in the Gila River and groundwater beneath the San Carlos Apache Reservation (Reservation). Indian trust assets of concern to this Project include water rights to Gila River surface flows (held by both tribes) and Reservation groundwater.

On August 7, 2001, BLM met with representatives of the Gila River Indian Community's Natural Resources Committee, Water Resources Committee, and Tribal Water Rights Group to provide information regarding the predicted impacts of the Project on Gila River surface flows, a trust asset of the Community. Representatives of the Community also attended a June 25, 2002, meeting involving BLM, USGS, BIA, PD, and representatives of the San Carlos Apache Tribe to discuss the Project status and water resources issues. At this time, BLM is continuing to consult with both the Tribe and the Community regarding the Alternate Year Fallowing Program and the predicted but unmeasurable impacts on both surface flows in the Gila River and groundwater flows beneath the San Carlos Apache Reservation.

#### **5.1.6.2 Office of American Indian Trust**

As required by departmental regulations, BLM initiated consultation with the OAIT, an agency of the Department of Interior created to ensure that the Secretary's obligations under the federal Indian trust responsibility are performed in accordance with the standards required by the laws and policies of the United States. The OAIT, among its other duties, reviews significant Departmental decisions affecting American Indian trust resources, including treaty rights.

The OAIT was kept apprised of the BLM's efforts to consult with potentially affected tribes about the Project's possible impacts to Indian trust resources, specifically Indian water rights to Gila River flows and to groundwater under the San Carlos Apache Reservation. At meetings attended by OAIT and through copies of correspondence with tribes, BLM provided information on how the proposed Alternate Year Fallowing Program (see Appendix F) for predicted physical impacts to Gila River flows would ensure no detrimental effects on tribal rights, trust resources, or health and safety. Consultation with OAIT is expected to continue through publication of the FEIS and conclude prior to issuance of the ROD.

## **5.2 ENVIRONMENTAL JUSTICE**

All federal agencies must comply with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." As defined by the BLM and EPA, compliance involves "the fair treatment and meaningful involvement of all people regardless of race, color, national origin,

or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies” (EPA 1997). The goal of “fair treatment” is “to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts” (ibid.).

For this EIS, compliance with Executive Order 12898 concerning Environmental Justice was accomplished through several means. Initial efforts focused on informing the widest possible cross section of the potentially interested public about the Project, and providing opportunities for input from not only the general public but from members of local and regional ethnic minority and low-income populations. Efforts targeting these populations included 1) making information about the proposed Project available in the Spanish language during both scoping periods; 2) contacting 11 Indian tribes regarding their concerns about the Project and making several special presentations to tribal representatives on their reservations; and 3) making extensive use of local radio in Safford and surrounding communities to disseminate information about the Project and announce public meetings. Especially in rural areas, radio can reach a wide spectrum of individuals across income lines. News releases and Public Service Announcements included a statement in Spanish regarding the availability of Spanish-speaking contacts at the BLM for those seeking more information.

In addition to these efforts, an analysis was conducted to determine if the Project would have disproportionate adverse effects on ethnic minority and/or low-income groups, including Native Americans. Results of such an analysis depends in part upon its scale. For example, on a statewide basis, it could be concluded that the Project disproportionately affects (either positively or negatively) low-income populations because Project impacts are concentrated in Graham County, and Graham County has a disproportionately poor population compared to the rest of the state. In 1990, Graham County ranked 13 out of the 15 counties in Arizona for both median household income and median per capita income, and had the fourth highest rate of persons in poverty (26.7 percent).

However, an analysis on this scale would not take into consideration the fact that the Project, and all reasonable and practicable action alternatives to the Project that meet the purpose and need, can *only* be located in Graham County. The project site is dictated by the location of the Dos Pobres and San Juan copper ore deposits and PD’s mining claims. Therefore, the approach to Environmental Justice taken in this EIS is to focus the analysis on populations within Graham County and address other groups only when possible adverse impacts extend beyond county lines. As shown in Section 3.2.5.1.1 of this document, the primary ethnic minority groups in Graham County are Hispanic and Native American. The portions of the county with the greatest concentrations of persons identifying themselves as Hispanic are parts of Safford; parts of Thatcher; and the towns of Solomon, San Jose, and Sanchez. Areas with the greatest concentrations of persons identifying themselves as Native American are the San Carlos Apache Reservation in general and the towns of Bylas and Peridot in particular. Areas with the highest proportion of low-income households are within and just outside the boundary of the San Carlos Apache Reservation, and within pockets in the communities of Safford, Thatcher, and Pima.

Regarding the issues analyzed in this EIS, and relative to other populations in Graham County, residents of the geographic areas cited above are not likely to suffer disproportionately high adverse effects from the Proposed Action and action alternatives. Table 5-2 lists potential direct, indirect, and cumulative adverse impacts identified in Chapter 4 for these alternatives remaining after consideration of mitigation, and identifies the group(s) most affected. In many cases, PD has proposed mitigation for impacts (see Table 4-42 and Appendix F); such mitigation measures, to the degree they are incorporated into the Proposed Action, have been considered in this analysis and preclude impacts from being significant or measurable.

## Chapter 5

In reviewing the information in Table 5-2, the project team determined that geographic scope/recipient groups ranged from localized (the project area; BLM allottees) to extremely broad (the American public); that a variety of groups are exposed to the potentially adverse residual impacts of the Project; that most of these groups are representative of the general demographic profile of Graham County or the Safford region; and that no pattern reflecting disproportionately high and adverse impacts to low-income and/or minority groups is apparent.

For those issues that are of special concern to Indian tribes in the region—notably, Native American archaeological and sacred sites, burials, and traditional cultural properties on potentially affected public lands—the BLM has consulted with the concerned tribes as required by the National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act (NAGPRA), and other federal laws, orders, and policies. The San Carlos Apache Tribe has gone on record as opposing an exchange of or mining on the selected public lands (letter from J.P. Sparks to M.L. Jensen and T. Terry, BLM Safford District, October 11, 1996. The Tribe's Elder's Cultural Advisory Council has stated that, among other concerns, "Some of the land parcels involved in this plan are located on land that is currently claimed by the San Carlos Apache Tribe. It would be wrong to continue with the proposed plan while this matter is unresolved....While this mine will provide jobs and money for the near future, it will destroy the land and good health of our grandchildren and future generations....The most important consultation we can give you is to ask you to reexamine the values that this mine represents" (letter from J. Cassa to M.L. Jensen, BLM Safford Field Office, January 15, 1997). For information on why the San Carlos Apache Tribe land claim was not analyzed as an environmental justice issue in this EIS, see Section 1.6.2.2.1.

Table 5-2. Summary of Residual Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project: Environmental Justice Analysis

Impact	Proposed Action	Partial Backfill	Land Exchange*	Group(s) Affected
<b>Land Use</b>				
Loss of BLM jurisdiction over land use	-	-	X	public lands users, including PD
Reduced use of public lands for the Johnny Creek Ride	X	X	X	Johnny Creek Ride event participants
Loss of use of surface water rights within the mine plan footprint	X	X	-	BLM allottees
Increased noise and vibrations from mine blasting	X	X	-	Safford Valley residents
Modifications to visual resources, nighttime lighting, and views of the Gila Mountains	X	X	-	Safford Valley residents
Increased potential for acid and materials spills and truck traffic	X	X	-	residents and drivers along portions of Hwys 77 and 191, including San Carlos Apache Tribal members
<b>Physical Resources</b>				
Creation of pit lakes	X	X	-	the public
<b>Biological Resources</b>				

*Consultation and Coordination*

Loss of vegetation and wildlife habitat on the project area	X	X	-	public recreationists, hunters
Impacts to historic and prehistoric archaeological sites	X	X	X	the public; various Indian tribes
Impacts to Traditional Cultural Properties identified by Indian tribes	X	X	X	various Indian tribes
Reduced grazing	X	X	-	BLM allottees

Table 5-2, continued. Summary of Residual Adverse Impacts of the Action Alternatives for the Dos Pobres/San Juan Project: Environmental Justice Analysis

Impact	Proposed Action	Partial Backfill	Land Exchange*	Group(s) Affected
<b>Cultural Resources</b>				
<b>Socioeconomic Resources</b>				
Increased demands on infrastructure (schools, utilities, housing, roads)	X	X	-	Safford Valley residents; Graham Co. residents
Reduced federal Payment In Lieu of Taxes (PILT) to county for federal lands	-	-	X	Graham County residents
Reduced BLM income from public lands grazing	X	X	X	the public

\* Impacts of the foreseeable mining uses of the selected and offered lands are not attributed to the land exchange alternative because the impacts are not caused by the exchange, simply enabled by it.

# CHAPTER 6

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